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# AMERICAN DYESTUFF REPORTER

VOLUME 10  
1922

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# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

JANUARY 2, 1922

NUMBER 1

## FEATURES OF THIS ISSUE

Charles F. Goldthwaite presents an able plea for the use of "decimal pounds" as a substitute for metric weights.

"Logarithmic Constants for the Textile Chemist," by George R. Pensel, shows how the textile chemist may use logarithms to advantage. Tables are included.

Proceedings of the American Association of Textile Chemists and Colorists include a communication from the President, report of Council meetings, and progress of Local Sections.

Subject and Author Index of the first seventeen issues of the Monthly Technical Supplement.

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the Practical Application of Dyestuffs and the Mechanical Equipment Incidental Thereto

Vol. X

NEW YORK, JANUARY 2, 1922

Number 1

## Decimal Pounds, or Metric Weights

A Reminder to Chemists and Dyers that There Is a More Convenient Way of Handling Avoirdupois Quantities in Terms Understood in the Office—Scales and Weights Are Obtainable

By CHARLES F. GOLDTHWAITE

*Chemist, Klearflax Linen Rug Company, Duluth, Minn.*

THE agitation for the adoption of the metric system into industry is always with us, but the possibility of such a change is still very remote. In the meantime, why not take advantage of more of the possibilities of our present "pounds"? No doubt our cumbersome pounds, ounces and grains look as impractical to some Europeans as the English pounds, shillings and pence to us. The difference between the present and a decimal system can be easily illustrated by working a few problems in terms of English money and then performing the same operations in our own monetary units. It is just the same in figuring weights, and there is one possibility of which we can easily take advantage, although it is apparently little used—the employment of decimals of a pound in place of ounces and grains.

### TWO SYSTEMS COMPARED

It is not only an advantage in the mill, where large numbers of miscellaneous weighings are made—especially in dyehouses—but will save a great deal of time in the offices where are kept inventories, cost and other records. Prove it to yourself. Add the two columns of figures which, we will say, represent weights of a certain dyestuff used during a day. Which can you do more rapidly? In which sum have you the more confidence? Which would you rather pay your help to do?

0.7324 lb. ....	11 oz. 50 gr.
1.25 lb. ....	1 lb. 4 oz.
0.313 lb. ....	½ oz.
3.50 lb. ....	3 lb. 8 oz.
0.265 lb. ....	4¼ oz.
0.1915 lb. ....	3 oz. 75 gr.

Now suppose these amounts are to be taken from your last inventory. You can subtract the first at once accurately. You do the best you can with the other and probably approximate the sum to save some more figuring. The next step is to deduct the value of the dye used from that shown on the inventory sheet, so this sum must be multiplied by the value per pound. The first sum can be multiplied directly. The second, if you want an accurate result, is reduced to a *decimal* and then multiplied. Why, then, not have the decimal in the first place?

That the use of decimal weights in dyehouses is practical is shown by its continued use for five years, at first by the writer and more recently by two dyers who had previously been accustomed to pounds and ounces. It is also used for many special purposes in the laboratory along with the metric system.

### YOUNGER ELEMENT MAY PROFIT

It is not expected that the older dyers who are accustomed to thinking in terms of ounces and grains will care to adopt a new system, but there is no good reason why students and those who have not yet acquired fixed habits should not become familiar with decimals of a pound and use them whenever possible.

Upon analysis it appears to be a question whether a dyer is really used to thinking in ounces when dyeing a set of pieces or batch of raw stock. If he has used ten ounces of some color and it is not enough, does he think of the lot as needing another *ounce* or (perhaps unconsciously) think of it as requiring about 1/10 or 10 per cent of what has already been used? Judging from the facility with which experienced dyers can work with laboratory quantities, or either large or small practical

lots of varying weight, it would seem that they must work largely on a percentage basis, visualizing the amount already used and adding some definite proportion of it if more of any color is needed. The writer has certainly worked in this way on grams of stock as well as on very large lots, and the method is probably common although perhaps unrecognized. If, then, our work is based on *figures* rather than on ounces and grains, it does not matter much what the figures represent as far as the dyeing is concerned, and we may as well use the decimals along with our pounds.

#### HOW THE DYER CAN AVOID EXTRA CALCULATIONS

It might appear from what has been said up to this point that decimals will be of more help to the office than to the dyer himself, but such is not at all the case. Assume that a formula for 125 pounds of stock takes one pound, six ounces, of color. How much will be required for 175 pounds? This represents a common problem and usually there are from two to four colors instead of one. However, you figure it, if you want an accurate result you change to a decimal and then go ahead. The result is in decimals and you change each back to ounces to weigh it out. There is an extra operation for each dye at each end of the calculation which can just as well be entirely avoided by the use of decimal scales.

Suitable balances or scales graduated in decimals do not seem to be very common, but they *are* obtainable from well-known manufacturers. A scoop scale with a capacity of ten pounds and a beam graduated in hundredths of a pound was found to be a stock article and has proved very satisfactory for general use. In this case the smallest division, 1/100 of a pound, is 1/6 of an ounce, and it is usually not necessary to weigh much finer than this on large lots of stock. For closer work a "cement scale" can be obtained from any chemical apparatus supply house, graduated directly to 1/10,000 of a pound, which is less than a grain. Still more convenient scales for particular purposes could no doubt be obtained, graduated to order, and the time saved by their use would quickly pay the extra expense. No doubt, also, a real demand for such scales would induce manufacturers to stock a better line.

#### "DECIMAL POUND" WEIGHTS

It will not even be necessary in all cases to buy new scales, as the apparatus houses also carry decimal pound weights for use with "even balance" scales. A set running from 0.5 to 0.001 pound, this smallest weight being equal to seven grains, and the whole adding up to one pound, is easily obtainable. The weights above one pound will either be on hand or can be obtained in any convenient way and the whole set can be made to answer practically any purpose.

If a change of scales is attempted, however, it is best to make it very gradually, preferably starting with new

formulas. The work is also facilitated by the use of a simple table of equivalents until somewhat familiar with the new units:

#### EQUIVALENTS OF OUNCES IN DECIMALS OF A POUND

Oz.	Decimals	Oz.	Decimals
$\frac{1}{4}$	0.0156	8	0.5
$\frac{1}{2}$	0.0312	9	0.5625
1	0.0625	10	0.625
2	0.125	11	0.6875
3	0.1875	12	0.75
4	0.25	13	0.8125
5	0.3125	14	0.875
6	0.375	15	0.9375
7	0.4375	16	1

#### CONNECTING UP WITH THE OFFICE

The writer is not in any sense opposed to the metric systems, as it would offer many advantages; for instance, in a print works where formulas are made up from both solids and liquids. It does not fit in well, however, with weights of cloth or other materials employed in the rest of the plant. Dyes and chemicals are almost invariably bought by the pound and the office systems are based on pounds, so the use of the metric system does not appear as practical at present as that of pounds and decimals. Therefore, while the idea of decimal pounds is by no means new, it seems worth bringing again to the attention of chemists and dyers who may not have tried it.

It is no more difficult for intelligent overseers and help to work with decimals than it is for machinists to do part of their work by quarters and sixteenths of an inch and the finer work in thousandths. Try it with an open mind and a little care at the start and you will find yourself well repaid.

#### DU PONT ANNOUNCES PONTACYL VIOLET 6BN AND DU PONT ORANGE RO

The Dyestuffs Department, Sales Division, E. I. du Pont de Nemours & Co., announces placing on the market Pontacyl Violet 6BN and Du Pont Orange RO. The former, states the announcement, is identical with the pre-war Acid Violet 6BN, and was formerly consumed more freely than any other of the Acid Violets, being especially suitable for dress goods in producing Navy Blues, etc., in combination with Wool Green S.

Du Pont Orange RO, and Acid Orange, is like pre-war Orange RO, which always had a large sale. It is of particular interest to paper mills and is, as is understood, stronger and more brilliant, as well as more reddish, than Orange II Concentrated.

Dr. William G. Beckers has been elected a Director of the Allied Chemical & Dye Corporation to succeed H. H. S. Handy, who recently resigned as Vice-President and Director



# Dye Soap

A Brief Outline of the New-Grown Industry and Its Possibilities

By ARTHUR T. BRAINERD\*

*H. A. Metz & Co., Chicago, Ill.*

TO those unacquainted with dye soap its introduction can be made in a few words taken from some of the enthusiastic advertisers of this new home dye product. "Dyes as It Cleans," "Will Not Streak, Run, or Fade," "Soils Neither Hands nor Utensils," they tell us.

The industry, if such it might have been called, was practically dormant for many years, though one or two attempts were made in years past to interest the public in dyestuff and soap mixtures which would be acceptable for home dyeing.

The unusual situation which developed in the dyestuff industry during the war, and the consequent publicity given to the manufacture and consumption of dyestuffs, paved the way in the public mind for the introduction of a new "dye" suitable for home application. Naturally simplicity of manipulation was one of the foremost factors to be considered by any one seeking to make capital of the new opportunity. With this point in mind, one company put on the market a combination of dyestuff and soap which could be used effectively without boiling.

## INDUSTRY IS LARGE DYESTUFF CONSUMER

From that beginning an industry has developed that is of much interest to merchandisers of dyestuffs because the public accepted the new soap with which it could wash its silk waist pink to-day and yellow to-morrow. Though dye soap as first produced had many disadvantages which caused much skepticism as to its success, it was so vigorously advertised and so widely distributed that the manufacturers became enormous dyestuff consumers within an amazingly short period of time.

During the first year or two of the life of the reborn industry it was generally assumed that only basic dyestuffs were suitable for combination with soap. Though much of the coloring power of basic colors is lost in an alkaline bath, nevertheless excellent tints are produced on silk by such a combination. Such tints formed the formation concerning dye soap manufacture.

## USE OF DIRECT AND ACID COLORS

The fact was soon discovered, however, that most di-

---

\*The writer is largely indebted to L. C. Cates for information concerning dye soap manufacture.

rect and some acid colors could also be used if properly incorporated in the soap base. Many freak combinations of colors are successfully used. The dye soap maker disregards the laws of chemistry and proceeds to use impossible recipes calling for Methylene Blue, Fast Red and Direct Black combined in a cake of soap.

Many discussions have taken place as to whether the ultimate dye soap is merely a mechanical mixture, or whether a chemical reaction actually takes place and a new compound is thus produced. Most chemists, who are also soap manufacturers, are inclined to the latter theory. One argues that Chrysoidine is changed from an orange to a brilliant yellow when applied in the alkaline bath of the dye soap. Another points out that the same proportion of Methylene Blue and soap can be made to produce either a light greenish tint or a deep blue shade by a slight variation in the process of production. A large amount of research work has been done in order to gain complete control of the various color combinations.

## GROWING MARKET FOR DYE MANUFACTURERS

The development of satisfactory dark colors was early recognized as necessary for the commercial success of dye soap as a universal home dye. This development is of interest to the dyestuff manufacturers, as it is in dark colors that quantities of anilines are used. With the comparatively large quantity of dyestuff contained in a cake of dark color soap, it is essential that the particles of dye be completely dissolved and properly distributed. If this were not done the user would be obliged to prepare the dye bath exactly as though straight dyestuffs were used. The dye soap manufacturer had told his customers to "rub it thoroughly," and it was therefore necessary for him to give his customer a cake of soap free from specks of dyestuff. Water could not be used as a solvent, since the volume required would be so large that a hard finished soap could not be obtained. It was therefore necessary to dissolve the dyes in specially prepared oils capable of completely dissolving water soluble colors. After solution in this manner the finished soap can be hardened. This process is the basis of several patents obtained by the inventors.

Further development rapidly followed. Direct colors are now added to practically all soaps, so that cotton fibers are truly dyed, instead of weakly stained. Basic

colors have been replaced largely by neutral and direct colors which dye silk much faster to light and washing. The soap has also been put on the market in flake and powder form. Wool dyeing with dye soap is not as a rule wholly successful, but the fact that some of the products are satisfactory was demonstrated to the writer when he was shown an army overcoat redyed a beautiful black with one of the popular brands of dye soap.

It is of more than passing interest to note that one of our enterprising dye soap manufacturers found himself cornering the market on some dyestuffs during the early period of American manufacture. So thoroughly did he clean up available supplies that the reaction forced him to pay large premiums on job lots whenever they could

be located. This manufacturer invested about \$200,000 in a dyestuff plant and within a few months supplied his soap factory with nearly all its "crude" dyes.

The dye soap manufacturers feel that their industry is still in its infancy. Although their sales have already been tremendous, concentrated effort has only lately been directed to export trade, which apparently will be far greater than the domestic consumption. The world likes to dye at home and the introduction of dye soap is making the art of home dyeing more convenient and simple.

As a present and future good customer, the dye soap manufacturer expects and deserves the assistance and support of the dyestuff producer in solving his numerous existing problems and those which will inevitably arise

## Logarithmic Constants for the Textile Chemist

A Number of Examples of Their Use, with Tables

By GEORGE R. PENSEL, B.T.C.

*Chemist, Ritter Textile Company, Amsterdam, N. Y.*

THE use of logarithmic constants for rapid calculation is of value to the textile chemist who tests deliveries of chemicals involving the use of acidimetry and alkalimetry.

The solutions most commonly used are N/2 hydrochloric acid and N/2 sodium hydroxide.

J. T. Baker's sodium carbonate C. P. special (anhydrous) is very satisfactory for the standardization titration against N/2 hydrochloric acid.

Sodium bicarbonate C. P. can be ignited to the carbonate, but the sodium carbonate C. P. special ignites to constant weight quicker, since only the mechanical moisture is to be driven off.

Indicators are used which will accurately show the point of saturation.

Let us assume that 0.6001 gram of sodium carbonate requires 23.65 c.c. of the standard hydrochloric acid solution, and with three other weighings and titrations the average log grams sodium carbonate per cubic centimeter hydrochloric acid was found to be 0.40443. The characteristic here and in subsequent figures has been purposely disregarded, since it is easy to determine the proper position of the decimal point through constant use of the table.

To find the log grams per cubic centimeter HCl of any given chemical, it is only necessary to add the 2 equivalents

log of  $\frac{\text{Na}_2\text{CO}_3}{\text{Na}_2\text{CO}_3}$  to log grams  $\text{Na}_2\text{CO}_3$  per cubic centimeter HCl.

For the determination of NaOH in caustic soda by titration with standard HCl solution, the following is an illustration of the method of calculation:

$$\frac{2\text{NaOH}}{\text{Na}_2\text{CO}_3} = \log 87845$$

Log 87845 + log 40443 = log 28288 (log grams  $\text{Na}_2\text{CO}_3$  per cubic centimeter HCl = 40443).

Log 28288 = log grams NaOH per cubic centimeter HCl.

Log 28288 + log cubic centimeter HCl (used in titration) + log 100 — log weight caustic soda = log per cent NaOH in caustic soda.

It can readily be seen that log 87845 is a constant for all determinations, while log 28288 is a constant as long as the HCl holds its value.

Check titrations can be made from time to time, and should the grams  $\text{Na}_2\text{CO}_3$  per cubic centimeter HCl vary, a simple addition of the new log to the constant, 2 equivalents

—————, corrects the value of the solution.

The following are permanent constants representing 2 equivalents

—————:  
 $\text{Na}_2\text{CO}_3$

Lactic acid .....	23003
Lactic anhydride .....	18406
Oleic acid .....	72602
KH tartrate .....	54993
Acetic acid .....	05346
NaOH .....	87845
$\text{Na}_2\text{O}$ .....	76737
Stearic acid .....	72924
KOH .....	02505
$\text{AlCl}_3$ .....	94968
Triolein .....	74513
$\text{HCOOH}$ .....	93826
$\text{NH}_3$ .....	50676
$\text{Na}_2\text{Si}_4\text{O}_{10}$ .....	45601
$\text{NH}_4\text{Cl}$ .....	00366
$\text{HNO}_3$ .....	07534

NaHCO <sub>3</sub> .....	20011
ZnO .....	88474
HCl .....	83760
NaHSO <sub>3</sub> .....	29309
Na <sub>2</sub> SO <sub>3</sub> .....	07531
H <sub>2</sub> SO <sub>4</sub> .....	96595
Rosin acids .....	81439

## HCL SOLUTION TEMPORARY CONSTANTS

The table below shows the HCl constants, which will be called "temporary constants." These, of course, result from adding log  $\frac{2 \text{ equivalents}}{\text{Na}_2\text{CO}_3}$  to log grams

Na<sub>2</sub>CO<sub>3</sub> per cubic centimeter HCl.

Log permanent constant + log 40443 = log temporary constant.

Lactic acid .....	63446
Lactic anhydride .....	58849
Oleic acid .....	13045
KH tartrate .....	95436
Acetic acid .....	45789
NaOH .....	28288
Na <sub>2</sub> O .....	17180
Stearic acid .....	13367
AlCl <sub>3</sub> .....	35411
Triolein .....	14956
KOH .....	42948
KCOOH .....	34269
NH <sub>3</sub> .....	91119
Na <sub>2</sub> Si <sub>4</sub> O <sub>9</sub> .....	86044
NH <sub>4</sub> Cl .....	40809
HNO <sub>3</sub> .....	47977
NaHCO <sub>3</sub> .....	60454
ZnO .....	28917
HCl .....	24203
NaHSO <sub>3</sub> .....	69752
Na <sub>2</sub> SO <sub>3</sub> .....	47974
H <sub>2</sub> SO <sub>4</sub> .....	37038
Rosin acids .....	21882

It is simply necessary to establish a ratio between the HCl and NaOH based on the point of saturation, using the proper indicator.

The log grams per cubic centimeter HCl values given above + log cubic centimeter ratio  $\frac{\text{HCl}}{\text{NaOH}}$  gives log grams chemical sought per cubic centimeter NaOH solution.

The following values are based on a log ratio of 02145, the log grams Na<sub>2</sub>CO<sub>3</sub> per cubic centimeter remaining 40443:

## NAOH SOLUTION TEMPORARY CONSTANTS

Log permanent constant + 40443 + log cubic centimeter ratio  $\frac{\text{HCl}}{\text{NaOH}}$  = log temporary constant.

Lactic acid .....	65591
Lactic anhydride .....	60994
Oleic acid .....	15190
KH tartrate .....	97581
CH <sub>3</sub> COOH .....	47934
NaOH .....	30433
Stearic acid .....	15512
AlCl <sub>3</sub> .....	37556
HCOOH .....	36414
NH <sub>3</sub> .....	93264
NH <sub>4</sub> Cl .....	42954
HNO <sub>3</sub> .....	50122
HCl .....	26348
NaHCO <sub>3</sub> .....	62599
NaHSO <sub>3</sub> .....	71897
H <sub>2</sub> SO <sub>4</sub> .....	39183
KOH .....	45093
Rosin acids .....	24027

In the calculation of B.t.u. (Emerson calorimeter) a logarithmic constant is not without value for a rapid calculation.

The following formula is given as an illustration:

B.T.U. CALCULATION  
*Emerson Calorimeter*

$$\frac{\text{Wt. water (in grams)} (^\circ\text{C.})}{\text{Wt. coal (in grams)}} = \text{calories}$$

$$\frac{\text{Wt. water (in grams)} (\text{factor}) (^\circ\text{C.} \times 1.8)}{\text{Wt. coal (in grams)} (\text{factor})} = \text{B.t.u.}$$

1.8 changes °C. to °F.

Factor is to change grams to pounds.

The factors cancel, so the ratio is not changed.

Add water equivalent factor to weight of water (1900 + 464 = 2364).

Log. Wt. water.....	37365
Log °C. ....	X
Log 1.8 .....	25527

Total .....	62892 + log X
Coal (in grams).....	log Y

$$62892 + \log X - \log Y = \log \text{B.t.u.}$$

or

$$62892 + \log ^\circ\text{C.} - \log \text{wt. coal (in grams)} = \log \text{B.t.u.}$$



# New Line of Drying Machinery Described

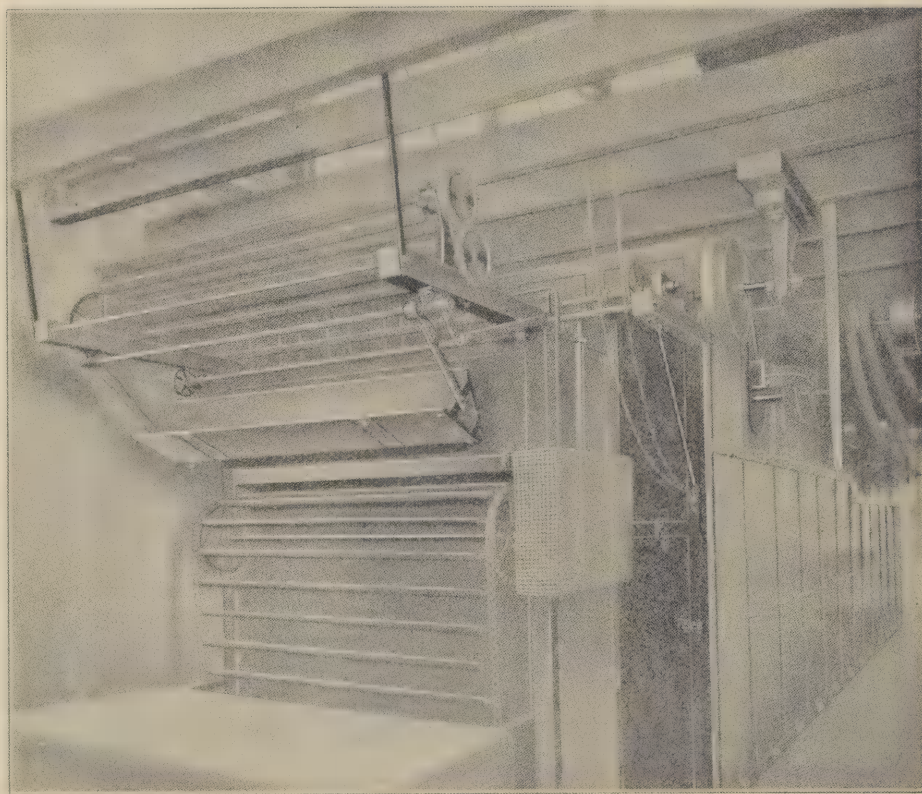
Various Structural Features Designed for Maximum Heat Conservation and Ruggedness

A NEW line of textile drying machinery has just been placed on the market by the Grinnell Company which has been designed with the aim of combining the best drying principles with the strongest and the most workmanlike construction practice.

In maximum heat conservation lies one of the features of these machines, which are built with an insulation of 1-inch air-cell asbestos placed between two walls of sheet metal.

## EASY ACCESS TO INTERIOR

The supporting structure of the housing is made of 10-gauge pressed steel members bent into suitable



*Grinnell Looping Dryer*

channels and angles. On this framework are clamped panels made up of sheet metal and asbestos, as described above. This construction gives immediate access to the interior of any part of the dryer.

Heating coils are made up of 1-inch pipe tested to 175 pounds. These coils are supported in the dryer well above the floor in order to promote the best circulation of air over and through the pipes, and also to afford easy cleaning of the floor beneath the coils.

## PROTECTING GOODS FROM OIL DRIPPINGS

Much trouble has often been experienced in dryers due to the dripping of oil from the fan bearings onto goods within the dryer. To overcome this difficulty, fan bearings are enclosed in a conical metal housing which is open to the outside air but is closed with respect to the interior of the dryer. Only the fan shaft extends through from one side to the other. Attendant on the prevention of oil getting through to the goods is the additional feature of keeping the bearings themselves in the comparative cool of the outside air.

Roller bearings are provided throughout to reduce friction losses to a minimum.

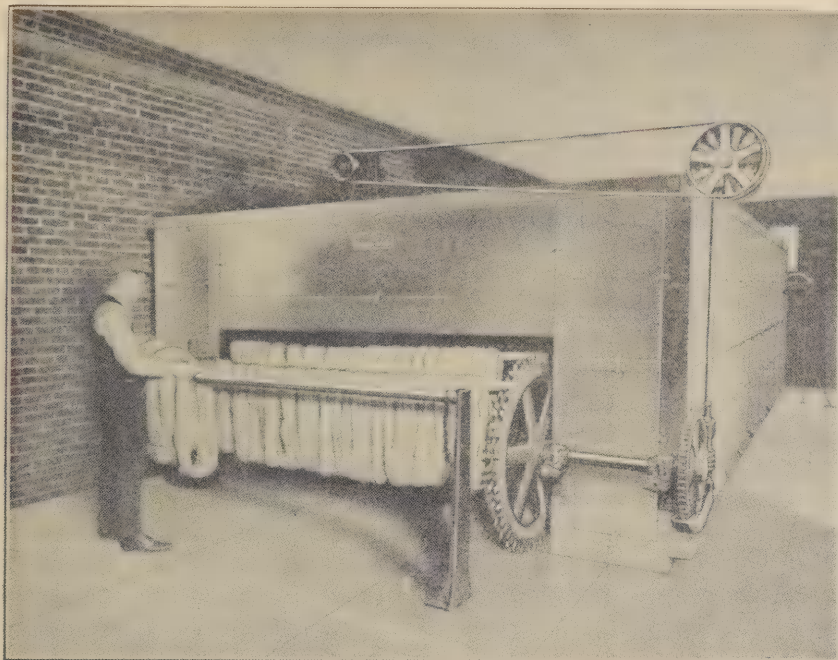
Another item on which especial stress is laid is the efficient utilization of the warm air within the dryer. In the past, much trouble has been experienced in conveyor dryers due to the excessive temperature of the air at the delivery end of the machine and to the high moisture content thereof.

## UTILIZATION OF WARM AIR

In this new line of dryers the trouble is largely eliminated by graduating down the radiating surface in each section progressively from the feed to the delivery end. Stock leaves the dryer in a comparatively cool state, as it should, and the moisture content of the air at that point is low. Air is taken in at the delivery end and, by means of specially designed baffle plates, is given a spiral motion from one end of the machine to the other.

With regard to the apron construction in the conveyor types of machinery, malleable iron chains are used, one on each side of the dryer. At evenly spaced intervals in the chain are links with special projecting attachments in the form of short studs, which fit into the ends of pieces of  $\frac{3}{4}$ -inch pipe. These pipes, extending crosswise from one chain to the other, form the carriers for the wire cloth apron which is attached thereto. All the pulling strain from the chains is, therefore, transmitted to the pipes rather than to the wire cloth itself.





*Delivery End of Grinnell Automatic Yarn Dryer*

#### AGITATORS

Agitators are placed at suitable intervals, to stir up the stock and promote even drying. The rotation of these devices picks up the material in a direction with the apron travel.

On all continuous type dryers the apron is driven through specially designed cone drives. With this arrangement any desired speed can be obtained, so that the exact point between underdrying and overdrying can be obtained. With the customary step pulley drive, this is not possible.

On the looping dryer this cone drive feature serves a dual purpose. In addition to the main cone drive controlling the forward movement of the pole carrying chains which support the loops, there are two additional sets of cones, one at either end of the machine and each controlling the speed of a set of rolls through which the cloth passes. The rotational velocity of either set of rolls may be changed independently of the other, and by this means any shrinkage of the goods as it dries, with the attendant shortening of the loops, can be compensated for.

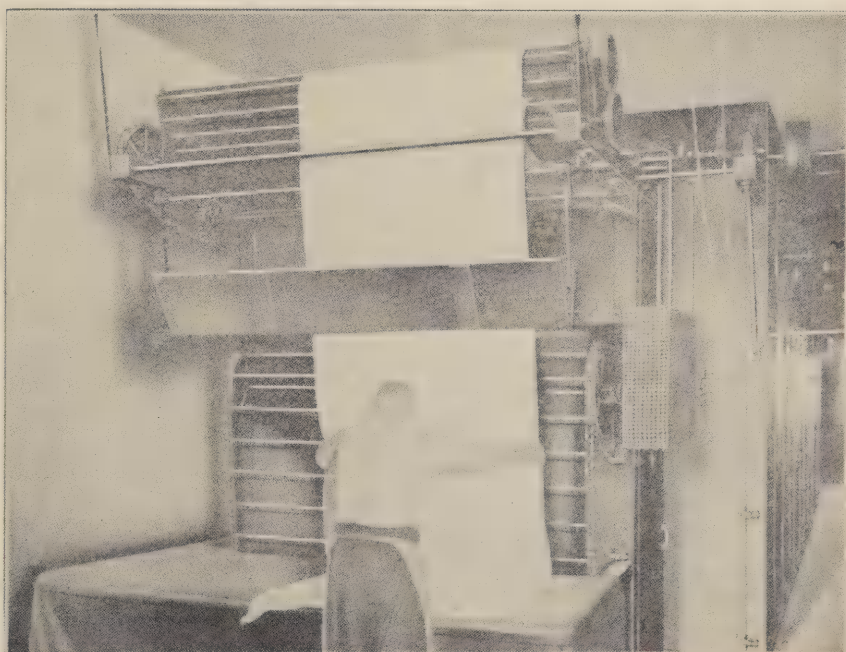
#### UNIFORM AIR DISTRIBUTION

Of course, in continuous types of dryers any and all parts of the goods

being dried pass progressively through the slowest and the fastest moving air currents, and uniform drying is naturally obtained. In the stationary types of machines, however, in which the goods remain at rest in a compartment, it is imperative that the distribution of air through that compartment be absolutely uniform, and to this end a specially designed diffusion plate is placed between the fan and the goods.

The average area of the openings in the plate is somewhat less than the area of the fan; furthermore, as in the case of the truck yarn dryer, wherein this plate is formed of a series of parallel slats lying horizontally above the skeins, the openings between slats increase progressively in width from the side nearer the fan to the opposite side. Uniform air distribution is thus produced.

The fundamental principle in Grinnell dryers is to complete the drying process by the slow movement of a very large volume of only moderately heated air, and this principle has been so worked out that the advantages of low temperature drying are secured with no advance in power or heating costs. This combination of low temperature and large volume brings about the effect of drying on a cool fall day with a strong, steady wind blowing. In other words, it approximates the ideal drying conditions obtainable in nature.



*Delivery End of Grinnell Automatic Looping Dryer*

# On the Action of Dilute Sulphuric Acid on Cotton Cellulose, and an Improved Method of Testing for Oxycellulose\*

By EDMUND KNECHT and E. P. THOMPSON

THE affinity for Methylene Blue of cotton which has been tendered by dilute sulphuric acid appears to have been first observed by Girard (*Comptes rendus* 81, 1105, 1875), and was later studied more comprehensively in Camille Koechlin (this *Journal*, 1888, p. 163). He showed that the maximum effect of sulphuric acid of 93 deg. Tw. in imparting to cellulose an affinity for Methylene Blue was obtained after six hours' treatment at 15 deg. Cent. More recently W. Harrison (this *Journal*, 1912, pp. 238 and 359) has further contributed to our knowledge of the subject and has shown that the product resembles oxycellulose not only by its increased affinity for Methylene Blue, but also by its decreased affinity for direct cotton colors. He mentions incidentally that cotton tendered either by dilute sulphuric or hydrochloric acid reacts with phenylhydrazine and that the products consequently resemble oxycellulose also in this respect. The fact that cotton tendered by hydrochloric acid does not show any increased affinity (the affinity in fact is decreased) for Methylene Blue is also alluded to in Harrison's first paper. This difference in behavior is explained by the assumption that the colloidal form of hydrocellulose produced by sulphuric acid is different from that produced by hydrochloric acid.

Soon after Chardonnet silk had come into the market an attempt was made by one of the authors to explain the affinity of this fiber for the basic colors. A qualitative examination of this fiber revealed the presence of sulphur and a quantitative determination showed that this was present to the extent of between 1 and 2 per cent (calculated as  $H_2SO_4$ ). This sulphur could not be extracted by carbon bisulphide. It was considered at the time that the sulphur had come from the ammonium sulphide used in denitrating, and that it might possibly be present as a thio-cellulose, and this might, by analogy with oxycellulose, account for the affinity of the fiber for basic colors. In view of our new results it would now appear that this view was probably erroneous.

The present work was undertaken as part of a more comprehensive investigation on the products of limited oxidation of cellulose, mainly with a view to throw further light on the cause of the similarity which exists in the reactions of oxidized cellulose (oxycellulose) and cellulose tendered by sulphuric acid. As far as possible

the conditions of concentration, time, and temperature, as well as the copper numbers, Methylene Blue absorption and tensile strengths of the oxidized and partially hydrolyzed yarns and fabrics, have been recorded. It was found that whereas the affinity of cotton tendered by sulphuric acid was increased for Methylene Blue and decreased for a direct cotton blue, it did not always react with phenylhydrazine or para-nitrophenylhydrazine. This reaction, in fact, was scarcely noticeable unless the action of the acid became so drastic as to cause more or less complete dismemberment of the fiber. In the case of hydrochloric acid, it was scarcely noticeable under any conditions. The observation made by Harrison to the effect that even after treatment with caustic alkali the sulphuric acid-tendered cotton retained its affinity for Methylene Blue was confirmed. Further investigation of the product led, however, to the remarkable observation that after washing with water and then subjecting to prolonged boiling with normal caustic soda it contained sulphur. Quantitative determinations showed that this amounted to about 1 per cent (expressed as  $H_2SO_4$ ). This result coincides with the presence of about a similar amount of sulphur in Chardonnet silk and with the difficulty experienced in removing all the sulphuric acid in "stabilizing" guncotton. It probably also accounts for the fact that whereas nitrocellulose made with mixed acids gives on denitrating a product which dyes with basic colors, nitrocellulose made by nitric acid alone and subsequently denitrated has no affinity for these dyestuffs (Knecht and Lipschitz, *J. S. C. I.*, 1914, p. 116). Although there is at present no evidence to show in what form this sulphur is contained in the cotton fiber, it seems now fairly evident that its presence is the cause of increased affinity for basic and decreased affinity for direct colors. These properties persist even after boiling with caustic soda, as does also the property of the treated fiber of yielding a more or less intense orange coloration when warmed in an acetic acid solution of *p*-nitrophenylhydrazine.

Bleached cotton yarn (with a copper number of 0.6) was wetted with about its own weight of sulphuric acid of 1.065 sp. g., and dried at 50 deg. Cent. for two hours. This treatment had completely destroyed the fibrous structure. The copper number was found to be 5.2.\*

\*A communication to the Society of Dyers and Colourists published in the journal of the Society, Nov., 1921.

\*All the copper values given relate to air-dried material.  
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# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

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Lowell Textile School, Lowell, Mass.

### Vice-Presidents

WILLIAM D. LIVERMORE      WILLIAM H. CADY

### Secretary

WALTER E. HADLEY  
5 Mountain Avenue, Maplewood, N. J.

### Treasurer

WINTHROP C. DURFEE  
516 Atlantic Avenue, Boston, Mass

### Councilors

JAMES L. AMSDEN	GEORGE A. MORAN
ELMER C. BERTOLET	WILLIAM K. ROBBINS
ARTHUR E. HIRST	WALTER M. SCOTT

### COMMUNICATION FROM THE PRESIDENT

The American Association of Textile Chemists and Colorists is well under way as far as organization is concerned. Several Council meetings have been held; the Research Committee has been organized and is making definite plans for future work; and the other committees provided for in the Constitution have been appointed.

The application for a Providence Section was soon followed by another for a Boston Section, and both of these have been approved by the Council. It is understood that active measures are being taken toward the formation of a New York Section and inquiries have already been made in regard to the possibilities of a North Adams Section.

Group activities of the various types described are fundamental, and are absolutely essential for the life and development of any organization. Without them no momentum could be attained and but little of a constructive nature accomplished. We must, however, continuously keep in mind the fact that it is the individual interests of the members—both as to what they may receive and what they may be able to contribute in the way of interest and service—that will determine the ultimate success of any organization of this kind. In other words, it is the sum total of individual endeavors that determines the real accomplishments of the Committees and Council, the various Sections and finally the organization as a whole.

If this is the case, would it not be well to consider a few of these individual interests and the various ways

in which members may receive the greatest good from, and in return contribute most effectively toward the development of, the Association.

In the first place, the Council will at all times be glad to receive suggestions and expressions of opinion from any of the members as to what type of activities will be of greatest value. As a specific example of the kind of assistance that might be given by members the following may be mentioned as an example: The AMERICAN DYESTUFF REPORTER by special request has assigned to us the central portion of their publication which, hereafter, is to be biweekly. The reason for requesting this particular location was in order that the proceedings might be removed from the rest of the journal, so that they might be bound as a continuous record of the work of the Association. To still further facilitate this, the publishers have been asked to number the pages of the proceedings consecutively at the bottom. In order that this may be satisfactorily accomplished it will involve the somewhat difficult undertaking of presenting exactly four pages or a multiple of four pages to the publisher for each edition in which our proceedings may appear. This means that we must always have sufficient material on hand for publication to facilitate this rather exacting requirement.

We should therefore be pleased to have *all* the members write a letter stating just the type of material they would like to see published in this section. Fundamentally, it will contain the official reports of Council and Committee meetings; the reports of Sectional meetings as soon as any may be held, with the publication as far as possible of all papers read before these Sections; any communications received from the members which may be deemed desirable to publish; all notices in regard to future meetings, election of new members, changes of addresses, etc. We wish to publish in this section any and all material available that may be of interest or value to the members and are taking this method to find out just what is wanted. *Please answer this question just as fully and promptly as though a special questionnaire had been sent to you.*

A valuable contribution to this section will, we hope, be the various communications which may be forwarded by members in regard to work they are doing, experiments performed in their laboratories, new methods devised, confirmation of the value of old methods, various interesting discoveries that they make from time to time and also such comments as they may wish to make in regard to the papers or reports which may be published, as well as replies to the communications of any other members.

It is not essential that papers be presented before a Section in order to be available for publication. We shall be pleased to receive and publish at any time such papers as the publications committee may deem to be of sufficient interest and value to the members.

Most members would say, at first thought, that there was nothing about which they could write, but further inquiry would reveal the fact that nearly every member has some special interest about which he could write something, even though it might be but little.

Think these things over conscientiously and let us hear from you 100 per cent strong.

(Signed) LOUIS A. OLNEY, President.

## SECOND COUNCIL MEETING

The second meeting of the Council of the American Association of Textile Chemists and Colorists was held Friday, December 9, at the Engineers Club, Boston, Mass.

The following members were present:

Prof. L. A. Olney, Wm. D. Livermore, Wm. K. Robbins, Geo. A. Moran, A. E. Hirst, Wm. H. Cady, W. M. Scott, Winthrop C. Durfee, W. E. Hadley.

Letters were read from James L. Amsden and Prof. E. C. Bertolet, who were unable to be present.

A letter from the Textile Alliance, Inc., was read which stated that it was the opinion of the present members of the Dye Advisory Committee of the Department of State that the addition of a member nominated by the American Association of Textile Chemists and Colorists would be of material assistance and that a number of dye consumers and manufacturers would be benefited through being in closer touch with their work in the matter of obtaining an adequate supply of German dyestuffs, satisfactory substitutes for which are not being produced in this country.

Furthermore, this letter stated that in accordance with their belief a resolution had already been passed which provided that with the approval of the Department of State the American Association of Textile Chemists and Colorists be requested to designate a representative who might be appointed by the Department of State to the Dye Advisory Committee and added to the Dye Advisory Committee of the Textile Alliance, Inc.

A discussion of this matter led to belief that such action would be desirable and that the Association might render more direct service to its members and their interests by such an affiliation.

In this connection, it was unanimously voted to recommend the appointment of William D. Livermore to serve as a representative of the American Association of Textile Chemists and Colorists. Mr. Livermore subsequently accepted the nomination and his name was forwarded to the Textile Alliance, Inc.

A number of applications for membership have already been received but in accordance with the Constitution, Article IV, no action could be taken until the expiration of

thirty days after a list of such applicants had been forwarded to each member for their consideration.

Winthrop C. Durfee presented a petition signed by forty-two members of the Association requesting permission for the formation of a Local Section in Boston. It was voted to authorize such a Section, and Winthrop C. Durfee was appointed secretary *pro tem*.

The geographical boundaries were designated to include New England with the exception of Rhode Island.

The desirability of having an official emblem for the Association having been presented to the Council, the matter was discussed and it was decided to defer any definite action until the next annual meeting.

The duties of the Library and Publication Committee were defined as follows:

It was voted that the Library and Publication Committee, acting in co-operation with the president, should be in general charge of the section of proceedings, published in the AMERICAN DYESTUFF REPORTER; that they should examine all papers presented for publication and make an effort to publish in this section such material as will be of greatest interest and value to the members.

It was voted that the duties of the Committee on Membership and Local Sections should be along the lines of securing desirable members and co-operating with Local Sections in developing their activities.

Mr. Livermore stated that but little had been learned in this country in regard to new dyes and coloring processes that might have been introduced in Germany during the past six years. He considered that it would be desirable to ascertain, if possible, what new dyes had been perfected during this period and to this end offered the following resolution.

That the Textile Alliance, Inc., be asked to ascertain if possible through E. S. Chapin, their Paris representative, what new dyes or other allied products used in the coloring of textile material had been perfected and used abroad during the period of the war, but which for some reason or another had not been exported to the United States.

The meeting of the Council was then adjourned.

W. E. HADLEY, Secretary.

## RESEARCH COMMITTEE MEETING

The first meeting of the Research Committee was held Friday, December 9, at 4.30 P. M., at the Engineers Club, the following members being present: Council, with exception of J. L. Amsden and Prof. E. C. Bertolet, and in addition Dr. Robert E. Rose and Dr. Wallace J. Murray.

A letter had been received from E. F. L. Lotte, expressing his regrets at being unable to attend.

Upon motion of Mr. Durfee, seconded by Mr. Cady, it was voted that the organization of the Research Committee be the same as that of the Council, the president of the Council being the chairman, and the secretary of the



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Association performing similar duties for the Research Committee.

Some time was spent in a discussion as to just what was included under the heading of Standardization. The chairman was of the opinion that standardization as a general term, should include the formulation and approval of methods of analysis, methods of testing and, perhaps later, specifications of some kind referring to compounds used in the textile industry; the establishment of standards expressing the fastness of dyed textile material to the action of acids, soaps, alkalis, etc. Also standard methods for the analysis of dyes and for analyzing chemicals, which can be adopted as more or less official. Also standardization of the nomenclature of dyes. In this connection it was mentioned that the Society of Dyers and Colourists were endeavoring to classify the dyestuffs and were about to issue a publication to be known as the *Colour Index*.

It was suggested that the dye manufacturers might be requested to mention the corresponding number of Schultz and Julius, or of the new *Colour Index* in connection with their products. It was also the opinion that it would simplify matters for the dye users if characteristic names could be used, indicating the dye manufacturer, followed by the commonly recognized name of the dyestuff, together with the index number as indicated above. If the dyes could be better described by a new nomenclature, then that should be used.

It was believed that a start should be made immediately in preparing a set of standards relating to fastness of dyed textile material, and that a beginning could well be made as regards fastness to washing. It was suggested that a series of trials be made with the view of establishing the maximum and minimum fastness.

The matter was discussed with some detail from the standpoint of the silk manufacturer, but it was clearly pointed out that subcommittees could handle wool, cotton and the different textile fibers with such variations as might be necessary.

The first step should be to actually define the basis of fastness and the opinion was expressed that certain definite dyes would have to be chosen which could be considered as possessing certain values when undergoing definite treatments and these known colors could be used to check against the color being examined. The colors within certain ranges could then be designated by different numbers.

It was mentioned that the trials should be conducted in comparison with type samples, it being pointed out in this connection that certain samples of cloth were at one time rejected by the Government simply because the tests conducted thereon appeared to differ from the original sample. When, however, the original and complained of samples were tested under parallel conditions they were found to possess identical properties.

It was pointed out that a rubbing test performed

by a heavy scrub woman would of necessity be different than that produced by a ten-year-old boy, but both would arrive at concordant results in comparison with a standard run at the same time.

It was believed that a satisfactory way could be evolved by adopting a number of washing tests, and then using a type color which will stand each test.

Attention was called to the fact that already an elaborate system had been worked out by a number of foreign dyestuff concerns and that a great number of papers relating to this subject have been published, also that an article had appeared on this subject in the *Farben Zeitung* in 1916, giving the report of a German commission which had been appointed for the purpose of such standard methods. A committee representing the garment manufacturers and silk manufacturers is already co-operating with the object of obtaining more satisfactory fastness.

One member was requested to prepare a paper covering bibliography of fastness tests and methods, which could be presented at the next meeting of the Research Committee, and it was suggested that each member, before the next meeting, give special thought to methods of testing fastness to washing.

It was suggested that, later on, something might be done towards preparing standard specifications for the purchase of dyes and chemicals and a member was asked to prepare a brief outline of this phase of the situation to be presented at the next meeting of the Research Committee.

The meeting was then adjourned until Jan. 13, 1922.

### FORMATION OF BOSTON SECTION

At the Council meeting of the American Association of Textile Chemists and Colorists held in Boston, December 9, a petition was presented, requesting the formation of a Boston Local Section.

The petition, which read as follows, was duly signed by forty-three active members of the Association:

"We, the undersigned charter members of the American Association of Textile Chemists and Colorists, desire to organize a Local Section in Boston, and hereby request the official approval of the Council as required by the Constitution of the Association.

"(Signed) Leander F. Conley, Frank W. Biery, Thos. J. Biery, Walter W. Carr, John Everett, John M. Hood, Frank E. Kenyon, Leonard S. Little, Wilfred Lord, A. McMillan, George A. Moran, Samuel Muirhead, Chas. L. Parker, William Welphey, William Woosnam, Louis A. Cliney, Arthur K. Johnson, Charles L. Howarth, Fred V. Hanson, R. B. Clogston, Fred Riley, Samuel J. Nichol, Winthrop C. Durfee, Walter C. Durfee, Joseph E. Traversers, Amos K. Hobby, H. R. Davies, W. B. Butterworth, B. C. Bond, Robert E. Fuller, H. E. Gile, F. A. Keyzer, J. L. Barrington, W. R. Moorhouse, A. K. Gyzander.



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Andrew Fisher, P. S. Crowell, John F. Bannan, Simon P. Kenny, William Stoehrer, Samuel A. Stubbs, Warren H. Whitehill, R. C. Smith."

It was the pleasure of the Council to approve the foregoing application, and in accordance with Article XIII of the Constitution, the Council proceeded with the election of a secretary *pro tem*, Winthrop C. Durfee being chosen in this capacity.

While this new Section is to be known as the Boston Local Section, the geographical boundaries of same will embrace the entire area of New England with the exception of Rhode Island, the latter ground already being fully covered by the Rhode Island Section, with headquarters in Providence.

Attention was called to the fact that in accordance with Article XV, members living in Connecticut or other adjacent localities could affiliate with the Rhode Island Section or a New York Section when formed, in case this proved more desirable.

It is a source of great satisfaction to the Council that since the organization of the parent Association, the members have evidenced such a spirit of co-operation. With the development of Local Sections, the diversity of subjects which will be discussed will impart an added interest which should abundantly increase as the different phases of the work undertaken by the various Local Sections develop.

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**NOTICE FROM THE SECRETARY—APPLICATIONS FOR MEMBERSHIP IN THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS**

All individuals who believe that they are eligible for membership in the Association and are desirous of affiliating with the organization can communicate with the secretary, who will gladly furnish application blanks and extend to them every possible assistance.

It is desirable that members of the Association should make an effort to interest all those whom they believe would make desirable members.

The secretary will at all times be pleased to provide members with as many application blanks as may be desired.

W. E. HADLEY, Secretary,  
5 Mountain Avenue, Maplewood, N. J.

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**INAUGURAL MEETING OF RHODE ISLAND SECTION**

Notice of a meeting to organize the Rhode Island Section of the Association was sent out December 23 by William H. Cady, secretary *pro tem*, calling the meeting for Friday, December 30, at the To Kalon Club, 26 Main Street, Pawtucket. The gathering was to be preceded by an informal dinner at the club, and Roscoe L. Chase,

formerly manager of the Arnold Print Works, was scheduled to give a talk on "Mercerization," after the business session. Owing to the date of the meeting being contemporaneous with the printing of this issue, a full account cannot appear herein, but will be given in the issue of January 16.

It is particularly requested by the Local Secretary that all members of the Association located outside of Rhode Island who desire to affiliate with the Rhode Island Section will notify Secretary Walter E. Hadley. Several Massachusetts men are already enrolled.

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**NEW YORK SECTION UNDER WAY**

E. H. Killheffer, chairman of the Library and Publication Committee, reports that he has secured more than the necessary number (twenty-five) of signatures to a petition for the formation of a Local Section in New York and that this petition has been turned over to the secretary of the Association for presentation at the next meeting of the Council.

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**NOTICE OF MEETINGS**

The next meeting of the Council will be held Friday, January 13, 1922, at the Engineers Club, Boston, Mass., at 4 P. M.

A meeting of the Research Committee will be held at the same place at 4.30 P. M. of the same day.

Members wishing to bring any matters to the attention of these meetings will please communicate with either the president or the secretary.

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**CHANGE OF ADDRESSES**

The following changes have been made in addresses of members:

BOND, B. C.,  
In care of I. Levinstein & Co.,  
231 Franklin Street,  
Boston, Mass.

CHASE, R. L.  
151 Elmgrove Avenue,  
Providence, R. I.

FISCHER, RALPH M.,  
Hasco Silk Dyeing Company,  
Paterson, N. J.

FRIEDMAN, LOUIS,  
Friedman Dyeing Company,  
2229 Creston Avenue,  
New York, N. Y.

GRADY, J. H.  
741 East Avenue,  
Pawtucket, R. I.

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# Differential Reduction of Vat Dyes\*

By WALLACE J. MURRAY

*Contribution from the Laboratories of Arthur D. Little, Inc., Cambridge, Mass.*

## INTRODUCTION

The purpose of this paper is to show how the selective reduction of vat dyestuffs may be used for their identification and analysis. The fact is well known that certain vat dyes, such as Thio-Indigo Red B, can be reduced by weak reducing agents, such as sodium sulphide; while others, such as indigo, require powerful reducing agents.

\*Read by title at Inaugural Meeting, November 6; now published in full.

such as sodium hydrosulphite. In connection with some analytical work it was found that a brom-indigo also could be reduced by sodium sulphide and dyed from a sulphide vat. This suggested that the ability to dye from a sulphide vat might prove to be a valuable test for distinguishing different vat colors, particularly indigo from its halogenated derivatives. The use of reducing agents other than sodium hydrosulphite and sulphide also promised to be useful.

Since these tests depend upon oxidation and reduction, it may be well to consider briefly at this point the nature



of oxidation and reduction reactions. The physical chemist defines oxidation as losing of negative charges by an atom or group of atoms. Reduction is the exact opposite. For example, when sodium sulphide acts as a reducing agent it is itself oxidized; that is, some of the sulphide ions having two negative charges lose them and become free sulphur having no charge. When free sulphur has negative charges forced on it, it is reduced and forms ions again. If an electrode were placed in the solution the negative charges, which the sulphur loses, would go to it and give it a negative charge. The charge on the electrode increases until its tendency to lose negative charges just balances that of the ions. This equilibrium charge would be attained instantly. However, if a charge greater than this were applied to the electrode by external means free sulphur would be reduced by having charges forced onto it. The magnitude of this negative charge can easily be measured with a potentiometer by the ordinary means used for electrochemical measurements. The magnitude of this charge is a direct measure of the tendency of the substance to lose negative charges, which in turn is a measure of its strength as a reducing agent. This measures also the resistance of the oxidation product (in this case free sulphur) to take on negative charges.

When no electrode is present any charges given up by one substance must be taken on by some other as they cannot be destroyed. Therefore, when two substances are mixed and the tendency of one of them to give up negative charges is greater than the resistance of the other to take them on, then the latter substance will be reduced; while if the tendency is less or equal to it, then no reduction will take place.

These remarks apply equally to inorganic reducing agents and to organic ones like indigo white or other reduced vat colors. When a vat color is treated with a reducing agent stronger than its own leuco compound, it will be reduced, but if it is treated with one of the same strength or weaker, no reduction will take place. The reducing power of the leuco compounds of vat dyes may be determined by direct electrical measurements, or by comparison with a graded series of standard inorganic reducing agents. The latter is the method we have employed in our work.

Since the total number of vat dyes is great, it was decided to confine our work to the blue dyestuffs. However, the methods described can be extended to cover other colors as well.

The greater part of our work was confined to indigoid dyes, due to the ease with which their reduction may be followed by the disappearance of color. Carbozole vat dyes act the same way; but with the anthracene vat dyes there is no similar destruction of color.

#### EXPERIMENTAL DATA

##### I. Selection of a Graded Series of Reducing Agents.

The series used, arranged according to decreasing potential or decreasing strength is as follows:

1. Sodium hydrosulphite
2. Sodium stannite
3. Sodium sulphide
4. Sodium arsenite
5. Sodium formate

The last two reducing agents were too weak to affect any of the true vat dyestuffs, and so need not be considered further at this point. They seemed, however, to reduce some sulphur colors, and will be dealt with later when considering such colors.

The strength of a reducing agent depends partly on its concentration. Therefore, reagents of standard concentration must be used in order to obtain consistent results. Our reagents were made up as follows:

1. *Sodium Hydrosulphite*.—Since solutions of this substance do not keep well, it was always used in the dried form. Lykopen, made by Rohm & Haas Company, of Philadelphia, was the grade used. About one-fourth gram was used in each test.

2. *Sodium Stannite*.—First a solution of stannous chloride was made up by dissolving 115 grams of crystallized stannous chloride in 170 cc. of conc. hydrochloric acid. This solution was diluted to one liter and kept in a bottle containing granulated tin. Sodium stannite solutions were prepared fresh for each test, since they do not keep well. They were prepared by adding 28 deg. Be. caustic soda solution to 5 cc. of the stannous chloride solution described above, until the precipitate first formed just redissolved. This took about 5 cc. This gives the correct amount for one test.

3. *Sodium Sulphide*.—250 grams of the crystallized salt were dissolved in water and diluted to one liter. Ten cubic centimeters of this solution were used for each test.

4. *Sodium Hydroxide*.—A 28 deg. Be. solution of caustic soda was used.

##### II. The Determination of the Relative Reduction Potentials of Vat Colors by Means of a Graded Series of Reducing Agents.

A very fine uniform suspension of one-fourth gram of dyestuff in 100 cc. of water was used for most tests. However, it was proved that the method could be used satisfactorily on much more dilute suspensions when necessary. Five cubic centimeters of such suspensions were treated with the quantity of reagent described above and enough water to make the total volume 20 cc. Reductions were carried out both at the boiling point and at room temperature. These experiments showed that the dyes which we experimented with could be arranged according to decreasing reduction potentials as follows. Dyes bracketed together have about the same potential:

Indigo	}	Reduce readily with hydrosulphite.
Ahthrene Blue GCD		Reduce difficultly with stannite.
Anthrene Dark Blue BO		Do not reduce with sulphide.

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Midland Blue R	}	Reduce readily with stannite.
Hydrone Blue		
Midland Blue 5B	}	Reduce difficultly with sulphide.
Midland Vat Blue MB		
Indigo Pure ADC		
Ciba Blue 2B		
Thio Indigo Red B		
[Sulphur Dyes] [Reduce readily with sulphide.]		

This table shows: (1) That the relative reduction potential of a dyestuff is a characteristic which could be used for their identification; (2) that the halogenated indigos, like Ciba Blue, have considerably lower reduction potentials than indigo itself, and that this difference can be utilized for distinguishing them.

### III. Influence of Condition of Sample.

All the results given above were obtained by testing fine, uniform suspensions of the dyestuffs in water. Whenever the sample was a fresh, smooth paste, simple dilution with water gave a satisfactory suspension. However, dried pastes, powders and dyed fibers always gave unsatisfactory results when treated in this way.

### IV. Method for the Preparation of Satisfactory Suspensions from Dry Dyestuffs and Dyed Fibers

1. *Dry Dyestuffs*.—In order to use these tests with powders, they must be first converted into pastes. Such pastes cannot be satisfactorily prepared by simply mixing the powders with water, even when they are ground together. However, the following method has been found satisfactory: 0.25 gram of the powder was mixed with 5 cc. 28 deg. Be. caustic soda solution and 50 cc. water; 0.5 gram of sodium hydrosulphite was added and the mixture warmed until reduction and solution took place. The solution was then oxidized with air to reprecipitate the dyestuff, and diluted to 100 cc. The suspension obtained was perfectly satisfactory for the tests.

In order to show the importance of this operation Ciba Blue 2B powder was tested, when ground in water and when treated as described above. The results were as follows:

CIBA BLUE 2B POWDER		
	Ground with Water	Reduced and Reoxidized
Sodium Hydrosulphite	Hot Rapid, Orange Solution	Very Rapid, Yellow Solution
	Cold Slow	Rapid
Sodium Stannite	Hot Slow, Very Incomplete	Rapid
	Cold Very Slow, Finally Reduced	Moderate
Sodium Sulphide	Hot Very Slight Reduction	Reduces Fairly Readily
	Cold No Reduction	Reduces Little, if Any

In order to prove that this method did not affect the reduction of dyes in a paste form, the following experiments were tried:

(a) A sample of Midland Vat Blue MB 30 per cent paste was tested directly, and a second sample was tried, reduced and reoxidized as described above. Identical results were obtained in the reduction test of both of these samples.

(b) A sample of synthetic indigo paste was tested directly, and a second sample of the paste was reduced without drying and then reoxidized. Here, also, identical results were obtained in the reduction tests in both cases.

This proves: (1) That reduction and reoxidization simply change the physical condition of dyestuff, but do not affect its chemical reactions; (2) that the oxidation products of hydrosulphite do not affect the reduction tests.

2. *Dyed Fibers*.—Reduction tests carried out directly on dyed fiber were found to be unreliable. The presence of the fiber apparently affects the ease of reduction of the dyestuff. In order to overcome this difficulty, the fibers were treated with a small quantity of dilute sodium hydroxide, and reduced with the smallest possible quantity of hydrosulphite. After reduction the fiber was removed from the solution and squeezed out against the side of the test tube. The resulting solution was then reoxidized to precipitate the dyestuff. The resulting suspension was found to be perfectly satisfactory for the tests. The amount of dye obtained in this way is usually very small, but is sufficient for the tests if they are carried out with care. The method could not be used with anthracene vat colors since their leuco compounds are substantive to cotton.

### V. Dyeing Tests.

Whenever we reduce a vat dyestuff in alkaline solution we should obtain a vat capable of dyeing cotton. Therefore, some vat dyestuffs should require a very powerful reducing agent like hydrosulphite to give a vat capable of dyeing; others should dye with sodium stannite, and still others with sodium sulphide. The fact that certain vat colors such as Thio Indigo Red B will dye in a sodium sulphide vat is well known, but apparently no use has been made of this reaction for analytical purposes. In case of indigo, Indigo Pure ADC and Thio Indigo Red B dyeing tests were made of a four-gram sample of white yarn in vats made up as follows:

HYDROSULPHITE VAT	
0.25 gram dry dyestuff	
0.3 gram sodium hydrosulphite	
2 cc. 3.5 per cent solution caustic soda	
70 cc. water	
STANNITE VAT	
0.25 gram dry dyestuff	
1 gram stannous chloride crystals	
6 cc. 28 deg. Be. caustic soda	
70 cc. water	



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## SULPHIDE VAT

0.25 gram dry dyestuff  
 0.7 gram sodium sulphide crystals  
 0.7 gram sodium chloride  
 1.5 grams soda ash  
 70 cc. water

In all cases the dyeing was done the same and the yarn was allowed to steep about one-half hour. The results were as follows:

## HYDROSULPHITE VAT

Indigo—Good color  
 Indigo Pure ADC—Good color  
 Thio Indigo Red—Not tried

## STANNITE VAT

Indigo—Very pale color  
 Indigo Pure ADC—Good color  
 Thio Indigo Red—Not tried

## SULPHIDE VAT

Indigo—Practically no color at all  
 Indigo Pure ADC—Fair color  
 Thio Indigo Red—Fair color

In the case of the other colors small pieces of white absorbent cotton were dyed in the test solutions obtained in the tests described above. In all cases the dyed material was well soaped and rinsed after dyeing. The result of these tests will be given in Table I. These test tube dyeing tests were found to be perfectly satisfactory and therefore should be used instead of the more elaborate tests described first. These dyeing tests were carried out only with a portion of the dyestuffs tests. In many cases the presence of salts in the sulphide and stannite solutions caused a considerable precipitation of the reduced dyestuff, and therefore gave rather weak dyeings, even when the reduction was satisfactory.

VI. *Application of the Tests to Sulphur Colors.*

Sulphur dyes are not considered true vat colors, but since they are frequently used under similar conditions to vat colors it was decided to try the reduction tests on them also. Five different sulphur blues, chosen purely at random, were experimented with, and in each case they reduced to a dark colored vat with sodium sulphide, and to a yellow or orange vat with sodium hydrosulphite. On oxidation the yellow or orange compounds oxidized, first to a substance apparently identical with the one found in the sulphide vat, and then finally into the true color of the dyestuff. This was particularly noticeable when some of the yellow solution was poured onto filter

paper and allowed to oxidize there. A list of these experiments with their results will be given in Table II.

These experiments show that the sulphur colors experimented with have two leuco compounds: a colorless one, having a high potential, and a colored one having a much lower potential. If experiment should prove that this is a common property of the sulphur colors, it would be a valuable and simple test for their identification.

Attempts were made to see whether the sulphur colors could be reduced with weaker reducing agents than sodium sulphide, such as sodium arsenite and sodium formate. When these reagents were used a considerable portion of the color dissolved as leuco compound. However, dilute caustic soda acted in the same way, and it was therefore impossible to tell whether the arsenite or formate had actually carried on any reduction. The reduction was very likely due to the presence of free sodium sulphide present in the dyestuff. Attempts were made to destroy this free sodium sulphide by washing or by aerating, but neither one was successful. Therefore, reduction tests with reducing agents weaker than sodium sulphide are unreliable with sulphur colors, although such reduction may, and probably does, take place. Sodium sulphite has been used commercially for the reduction of sulphur colors and is considerably weaker as a reducing agent than sodium sulphide and somewhat weaker than sodium arsenite.

## CONCLUSIONS

1. The relative reduction potentials of vat colors may be determined readily by reduction with a series of alkaline reducing agents of graded potentials.
2. The reduction potential of a vat color is a characteristic which is of value in the identification of the color.
3. Halogenation decreases the reduction potential of indigoid dyestuffs.
4. In order to have these tests reliable the dyestuff must be in the form of a very fine suspension in water, such as is obtained by diluting paste color.
5. In case the dyestuff is either a dry powder or is present upon a fiber, it may be obtained in a proper condition for test by reducing and reoxidizing. In the case of the fiber test this would probably be true only of indigo dyes, since the leuco compounds of anthracene dyes are substantive to cotton.
6. The ability to dye cotton is a good indication of the reduction of the dyestuff; although not an absolutely reliable one, due to the partial precipitation of the leuco compound by salts present in the solution.
7. Certain and probably many sulphur colors give two differently colored vats, depending upon the reduction potential of the reducing agents used, but both of these reoxidize to the same color.

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Editor's Note—The tables mentioned in the above article will be published in the next issue.

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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## THIS ISSUE

IN accordance with the announcement printed in The REPORTER last week, the present number inaugurates the changed policy which will hereafter govern publication of this magazine. In order that there may be no misunderstanding, we take this opportunity of repeating the gist of what has already been set forth: Publication of the Weekly News Section has been suspended. Publication of the Monthly Technical Section—as a monthly—has been suspended. Both have been combined and will appear henceforward every other Monday, making twenty-six issues per year in all. The bi-weekly magazine, of which the present issue is the first example, will preserve substantially the form in which you now see it, will consist of forty-eight or more pages per issue, and will be made up of the following classifications of contents:

1. Technical articles of high standard, designed to keep the reader abreast of the most advanced chemical thought and practice, prepared by leading textile and color chemists and chemical engineers throughout the industry.

2. The complete Proceedings of the American Association of Textile Chemists and Colorists and its present and future local Sections, together with notices of meetings, announcements, addresses and all news relating to the activities of this important organization.

3. General news of all dye making and dye consuming industries, and of the equipment field, as well as editorial comment, correspondence, patents, reviews, the inquiry department, etc., etc.

No pains will be spared to secure accurate, fresh and authoritative articles and information, and in order to bring this about The REPORTER has no hesitation in asking for the co-operation and criticism of its readers. Suggestions and ideas for making more effective the service which we shall try to render will at all times be

welcomed and carefully considered, the sole aim of the publishers being to produce a magazine which will be informative and helpful.

## THE INDEX

THE REPORTER provides with this issue an index to the first seventeen numbers of the Monthly Technical Section, from August, 1920, to December, 1921, inclusive. This embraces all of Volumes VIII and IX, and five numbers of Volume VII. Owing to the amount of ground to be covered, this index is not so complete as we could wish; for instance, the titles of patents have been omitted and the various subjects treated under the head of Inquiries have of necessity been handled with rather scant ceremony. Nevertheless, the lists of technical articles and authors are wholly adequate, and in future, when we shall not be obliged to condense the accumulation of seventeen months' material, indices will be in keeping with the best practice.

As will be noted, the present Index is bound in with the first number of a new volume. This can readily be lifted out and bound with the seventeen numbers to which it refers, but if librarians or others desire extra copies they may obtain them without charge by addressing this office.

## A LEAF FROM THE GERMAN BOOK

OF late there has been a revival of discussion concerning the need for more technical men in the American dyestuff field, both in the selling and application departments, as well as of service generally, and this, as sooner or later it was bound to do, has brought up the question of executives. For, in the final analysis, it is they who have the power to make or mar an industry, and it is to them that one must apply for recognition of improved methods, changes of policy, the employment of suitable men to carry on the work, and, in general, all that is fresh and vitalizing.

One does not think very far along this line before he is brought face to face with the realization that the American dye industry differs from the German in that the latter is directed by technically trained experts of exceptional ability and complete understanding of the needs of their own industry. They have all had practical experience in the factory and the laboratory, and can sense a weakness almost before it develops. Years of training and a highly specialized knowledge are the only factors which can produce this type of executive, who, in turn, is the only type which can produce one hundred per cent results.

In the American industry, however, while one also finds very able men in charge, in a majority of cases these are not technical men at all, but rather those who have gained their business experience along other lines of manufacture or in the financial field. In view of this, the results which they have accomplished have been remarkable, and before going any further it must be emphasized that there is not the slightest disposi-



tion to find fault or criticise. On the other hand, there should be words of praise for the great work already wrought. What has been suggested, however, is that the time has come when something more is needed. Excellent as the present system is, it could be bettered. It is not one hundred per cent efficient, and with the ever-impending threat of German competition, nothing short of one hundred per cent will be enough.

To the layman, the many reasons why so complex an industry as the dye industry should be guided by technical men are not at once obvious; in all likelihood he could not enumerate them; though, if he thought much about it he would quite probably give this as his verdict "on principle." But to the initiated these reasons are so clear as to need no cataloging. It is not, remember, that the work being done is not good, but that it might be bettered. Something more than efficient management is called for. The industry will require those imaginative qualities possessed by the German "Technische Reisende." In other words, a full knowledge of the *possibilities* is required before new forms of consumer-service, and constructive changes, can be conceived.

When it comes to a question of results, where could one turn for a better demonstration of the maxim that "knowledge is power" than to the German dye manufacturers? There is no question about their results, and there is no question but that when they renew their effort to capture American markets, their service and their production processes will be superior to ours unless the latter are supervised by men of larger technical trainings and broader experience in this particular field. Already we have imported German chemists to show us how to save time in overcoming the countless obstacles which arise in dye making. Why, then, would it not be well to take another leaf out of the German book and emulate their system of placing technically trained men, possessing also in combination great business ability, in the executive offices which control the production and distribution of our dyestuffs?

## 1922

THE year just ended has been full of disappointment for many. It has seen unemployment grow to unwonted proportions, and that is always a sign of something wrong at the heart of things. Others have been disappointed because it did not realize to the full the joyful predictions of the extreme optimists. But in the end, however, and in all fairness, it may be said that it left us better off than it found us—if not actually, at least in prospect. And that is a great deal.

Early in the year, the slogan "1921 Will Reward Fighters" gained wide currency and considerable popularity. Many acted upon its suggestion and discovered it, on the whole, to be a fairly sound doctrine. Beyond a doubt the art of salesmanship was rediscovered during the last twelvemonth. Those who con-

tinued to bemoan their luck got nowhere, while those who went in search of better times, found them more often than not. Again, it is true that they did not bring about a return of the floodtide of prosperity enjoyed during the war, but they effectively prevented the threatened stagnation. The condition of the textile mills, in the aggregate, unquestionably improved, and while the public has not yet got completely over its "buying strike," a man with a fair product, at a reasonable price, can to-day count himself better off than he was in the unsettled times of a year ago.

Potentially, the condition of the dye industry is better. It is a long way from being on its feet again, but the important thing is that the turn has been taken and that most of those engaged in this calling know it. The one great blight upon the industry is the continued failure of Congress to settle the dye protection controversy and end the suspense which is keeping research departments inactive and holding back progress. It is utterly idle, vain and futile to repeat once more the shopworn phrase "The time has come for action!" and we shall not attempt it. Congress will pursue its own unresponsive way, whether or no. Nothing can make our legislators realize that the time factor is almost as important as the protection factor in this controversy. Matters will have to take their appointed course in their appointed time; all that can really be done is to ask for and insist upon the rights of dye makers, the dye consumers and the American public being provided for in the final decision.

As we enter the New Year let us, however, resolve to keep what we have already gained and do our part toward attaining the goal of complete readjustment and stabilization—or, in other words, "normalcy."

## EXPLANATIONS ARE WANTED

THE charges of Albert M. Patterson, President of the Textile Alliance, Inc., that the United States Department of State was influenced by "present or former German agents" to terminate the existing arrangement for the handling of reparation dye imports by the Alliance, calls for something more than a mere interchange of politely worded resolutions and epistles. Mr. Patterson leaves a great deal to the imagination of those not "on the inside," so to speak. Any one so fearlessly specific as he should furnish more in the way of substantiating detail, or else, in all fairness, keep such statements out of the press until prepared to do so.

In his letter to the various organizations interested in dyestuffs, which is reproduced elsewhere in this issue, he reasons as follows: "As the Department's action was not due to dissatisfaction with the conduct of the affairs of the Alliance, this determination [to terminate the import and distribution arrangement] evidently resulted from the protests made by present or former agents of the German dye manufacturers." And again: "Although it is evident that the Department of State terminated its arrangement with the

Alliance because of the pressure from the present or former agents of certain of the German manufacturers constituting the Interessen Gemeinschaft, nevertheless . . . etc."

And there he rests his case. He does not speak as one fully aware of the extreme gravity of his charge, or of the gravity of setting it thus before the public only to dismiss it without a word. The Department of State is one of the most important in our Government; its head holds the highest office in the Cabinet. It is this Department which Mr. Patterson now declares, with seemingly the utmost confidence, has yielded to the pressure of German agents.

He reasons, in effect: *Since* the State Department was not dissatisfied with the conduct of the Alliance, its decision *must* have resulted from the influence of German agents.

Surely that reasoning is anything but sound as it stands. It assumes but one alternative to dissatisfaction as a cause for the action of the State Department. And if pro-German pressure was the only possible alternative, this fact will be news to many in the dyestuff manufacturing and consuming industries. No; it is perfectly obvious that Mr. Patterson's conclusion was based on something more than the logic which he submits to trade and public. It has all the earmarks of sustained prior expectation and observation. And if this be the case, why, in the name of all that's fair and reasonable, can he not come out with the observations which led him to his conclusion? Having made his charge, he should back it up.

Meanwhile, Assistant Secretary of State Dearing declares that the only reason for the action of his Department was a question as to the legality of its co-operation with the Alliance. And there is this to be borne in mind: The arrangement was begun under another Administration, and, having drawn forth no protests at the time, would naturally be continued while that Administration remained in power. With the advent of a new Administration, accompanied by a complete replacement of Cabinet officers, including the Attorney General, directly concerned with such matters, it is customary that the arrangements of the previous officeholders should undergo a thorough inspection. New minds may place new interpretations upon established rulings, and under such circumstances it is not at all improbable that a question might have been raised as to the legality of the arrangement between the State Department and the Textile Alliance. It is almost always thus when one party succeeds another in power; it is expected, and creates no comment. So much for the Government side of the question.

The question of the importation of reparation colors from Germany is an important one, but for once it is transcended. It is wholly irrelevant to the present issue. The REPORTER has endeavored to set before its readers the utterances of both parties, but, pending further revelations, if any be forthcoming, it has no axe to grind and no comment to make save that this matter calls for an investigation. The situation is simply this: The head of

a well-known trade organization charges a Government Department with yielding to pressure from foreign agents bent on doing ill to an American industry. The public has been duly notified of this, and now has a right to the facts. Moreover, it will demand the facts, and will permit neither party to withdraw until this charge is proven or quashed. This is no intratrade matter, to be settled quietly and without publicity. It is public property, and as such should become a leading subject for the attention of the Senate investigating committee consisting of Senators Shortridge, Borah and Reed.

#### ON THE ACTION OF DILUTE SULPHURIC ACID ON COTTON CELLULOSE, AND AN IMPROVED METHOD OF TESTING FOR OXYCELLULOSE

(Continued from page 8.)

By similar treatment, using hydrochloric acid of 1.008 sp. g., a product is obtained having a copper number of 5.1.

For comparison an oxidized yarn was prepared by the permanganate process (this *Journal*, 36, 10, p. 251), using sufficient oxidizing agent to supply 1/12 atom of oxygen per cellulose unit,  $C_6H_{10}O_5$ . For this purpose 10 grams of cotton yarn were immersed in a solution of 0.33 gram of potassium permanganate in 10 deg. Tw. sulphuric acid. This was freed from manganese and thoroughly washed. Its copper number was 5.3.

Although the copper numbers of the above products are in fair agreement, the result of the acid treatment is to destroy the fibrous nature completely, whereas the oxidation process resulted in a much less severe action. The product was still fibrous, but its breaking strength was reduced to 28 per cent of its original value.

All the products gave a yellow color on boiling with N/2 caustic soda, with some loss in weight; the action was, however, much more pronounced in the case of the oxidized yarn.

The treated yarns were then dyed in Methylene Blue and the amounts of dyestuff left behind in solution estimated quantitatively by means of titanous chloride, the amounts taken up by the fiber being arrived at by difference. Untreated cotton was dyed under identical conditions for comparison.

Product Examined	Percentage of Methylene Blue Fixed
1. Bleached cotton .....	0.338
Sulphuric acid-treated cotton .....	1.004
Oxidized cotton .....	0.747
2. Bleached cotton .....	0.345
Hydrochloric acid-treated cotton .....	0.282
Oxidized cotton .....	0.761

These quantitative results illustrate numerically the similarity between oxidized and sulphuric acid-treated



cellulose. The product obtained by the action of sulphuric acid on cotton behaves like the product of oxidation also with regard to its dyeing property with direct cotton dyes, in that they both resist these colors to an extent depending upon the degree of modification.

On account of this similarity the following experiment was carried out to determine whether any oxidation takes place by the sulphuric acid treatment:

Calico was spotted with a 5 per cent solution of sulphuric acid, placed in a flask on a water bath, and heated in an atmosphere of carbon dioxide until dry. The gases from the flask were passed through a very weak solution of iodine. As no action was observed, this was regarded as an indication that no sulphurous acid was formed, but the product nevertheless possessed the increased affinity for Methylene Blue. Since the action takes place out of contact with atmospheric oxygen, and as no sulphuric acid is reduced, oxidation cannot have taken place and the product cannot be an oxidized cellulose.

Another sample of sulphuric acid-tendered cotton was boiled in water for an hour and in N/2 caustic soda for an hour. This was then thoroughly washed by boiling with water. Sulphur was still present in the residual fiber. Even when the alkali treatment was extended to a boil of four hours and the mass allowed to stand overnight in the alkaline liquor, there was still sulphur present.

*Estimation of Fixed Sulphur.*—Five grams of calico, wetted with its own weight of 2N sulphuric acid was dried at 40 to 45 deg. Cent. for two hours. It was then boiled for half an hour in distilled water, and for half an hour in 500 cc. of N/10 caustic soda, being thoroughly washed again by boiling in water for an hour. The mass was dried and the sulphur estimated. To this end the dried product was dissolved in nitric acid (sp. g. 1.5), and the solution after dilution neutralized by addition of caustic soda solution. This was evaporated to dryness in a silver dish and the temperature raised until combustion took place slowly but completely. The residue, when quite white, was taken up with water, nitrates removed by evaporating down with hydrochloric acid, and the sulphate present estimated by precipitation as barium sulphate.

The sulphur present expressed as sulphuric acid amounted in one case to 1.14 and in another to 0.97 per cent on the weight of the original cellulose.

The action which takes place when dilute sulphuric acid is dried into cotton is of a twofold character. The cellulose is partially hydrolyzed, which results in a reduction of the strength of the fiber, and there is also a fixation of some of the acid which behaves as a mordant for basic colors. By drying 1 to 10 per cent solutions of sulphuric acid into cotton, both these actions take place the product being tendered and possessing a very great affinity for Methylene Blue, Rhodamine B, Crystal Violet, etc., even after prolonged washing with water and alkali. It has very little affinity for direct colors, notably Diamine Sky Blue. It was indicated by Harrison that the increased affinity for Methylene Blue did not depend on

the degree of tendering. It has now been found possible to separate these two actions. Thus, if cotton is boiled with sulphuric acid of 1/2 per cent strength for an hour, its strength is impaired but its affinity for Methylene Blue is not increased but slightly diminished. No sulphuric acid is fixed. Cotton which has become tendered without having its affinity for basic colors increased may therefore be produced by hydrochloric acid or by prolonged exposure to hot weak sulphuric acid, which is not allowed to concentrate. Tendering by oxidation or by allowing weak sulphuric acid to dry into cotton results in an increase in affinity for Methylene Blue.\* Moreover, it has been found that cotton modified by drying-in sulphuric acid has a marked affinity also for the leuco compounds of Methylene Blue, Crystal Violet, etc., whereas in the case of oxidized cellulose this affinity is only just perceptible. The behavior of the two products towards direct cotton colors (Diamine Sky Blue is very suitable) after treatment with caustic alkali serves to distinguish between them. Both oxidized and sulphuric acid-treated cotton resist the dyeing with Diamine Sky Blue, but if boiled for half an hour with 5 per cent caustic soda, the affinity in the case of oxidized cellulose is restored, whereas the slight affinity of the sulphuric acid product is not altered.

#### SUMMARY

1. Cotton which has acquired an increased affinity for Methylene Blue and a decreased affinity for Diamine Sky Blue by treatment with dilute sulphuric acid is not oxidized cellulose, but contains fixed sulphur which is not removed by washing with boiling water or alkali.

2. The characteristic affinity of Chardonnet silk for basic colors is due to the sulphur (or sulphuric acid) fixed during the nitration with mixed acids and not during denitration.

3. The affinity of oxidized cellulose for leuco Methylene Blue is very slight, whereas it is very marked in the case of the sulphuric acid product.

4. Oxidized cellulose and sulphuric acid-treated cellulose may be distinguished by boiling with weak alkali and dyeing with a direct color (Diamine Sky Blue).

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With a capital of \$5,000 the Bronman Fur Dressing Company has been incorporated under the laws of New Jersey to manufacture, buy, sell, import, export, prepare, dress, tan, dye and deal in and trade in all or any kinds of furs, pelts, skins and hides, as well as to manufacture and deal in fur goods and garments, and leather goods. Headquarters of this new firm will be located in Newark.

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J. E. Coplin, formerly of the Muscogee Manufacturing Company, Columbus, Ga., has become Overseer of Dyeing for the Deep River Mills, Randleman, N. C.

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\*The affinity of oxidized cotton for Rhodamine B is only slightly greater than that of ordinary cotton, whereas the sulphuric acid product dyes a very heavy shade.

## **DECLARES U. S. DEPARTMENT WAS INFLUENCED BY GERMAN AGENTS TO END REPARATION DYES AGREEMENT**

**Head of Textile Alliance Openly Charges Pressure  
Was Brought to Bear—Dearing Asserts Question  
of Legality Was Only Cause—Woolen and  
Cotton Men Ask Protection Against  
Alleged Move of I. G.**

DEVELOPMENTS of the past week in the situation created by the termination of the arrangement between the U. S. Department of State and the Textile Alliance, Inc., with headquarters in New York City, whereby the latter has been handling this country's allotment of reparation dyestuffs in conjunction with the Government Department, included the assertion by Assistant Secretary of State Dearing that the lack of legal authority only was the cause for terminating the arrangement, which has continued for two years; and the issuing of a circular letter over the signature of Albert M. Patterson, President of the Alliance, in which the latter asserts that the action of the Department was prompted by the influence or pressure of present or former agents of the Interessens Gemeinschaft.

No reasons are given by Mr. Patterson for this conclusion, but the statement, at least, is very positive, and occurs several times throughout the letter, which has been sent broadcast among the various associations of dyestuff consumers as an appeal for support and concerted action to prevent the lapsing of the United States option on our percentage of the German reparation dyes as determined by the Versailles Treaty.

Resolutions were passed by the American Association of Woolen and Worsted Manufacturers and the National Association of Finishers of Cotton Fabrics urging support for the Alliance and calling upon the Government to prevent the distribution of reparation colors through private firms. Copies of these resolutions, as well as a pertinent extract from the minutes of a meeting of the Board of Directors of the Alliance, held to discuss the State Department's move, accompany the letter, which follows:

"The Department of State on December 14, 1921, informed the Alliance that the existing arrangement for the importation and distribution of German reparation dyestuffs should be terminated. As the Department's action was not due to dissatisfaction with the conduct of the affairs of the Alliance, this determination evidently resulted from the protests made by present or former agents or representatives of the German dye manufacturers. The Department considers that the conclusion of the arrangement will not affect, so far as it is concerned, the carrying out of existing contracts by the Alliance relative to the importation and distribution of dyestuffs from the Reparation Commission by the Alliance.

It has conveyed that information to the Reparation Commission.

The Alliance has been importing the dyes which were allotted to the United States under the terms of the Treaty of Versailles. The purpose of the reparation provisions of the treaty was to provide the allied countries with those required types of dyes not made by their domestic manufacturers upon such terms as to price and delivery as would enable them to compete with their German consumers of similar dyes and safeguard them from attempts on the part of German dye manufacturers to impose excessive prices to favor their own consumers of dyes or otherwise to exploit a substantial monopoly of a large part of most valuable and expensive colors.

### **HAS IMPORTED 2,587,665 POUNDS OF DYES**

"In performing this work the Alliance has in about two years imported 2,587,665 pounds of dyes, to the value of \$7,508,533.08, a large part of which were sold at actual cost. The remainder the Alliance was obliged to secure, under authority from the Department of State, by an outright purchase, as they would have otherwise been lost to the United States to the detriment of the American consumers. To make this purchase and to provide for the charges which would accrue an underwriting syndicate became necessary which was composed of concerns and individuals who guaranteed the necessary amount of money upon the understanding that any excess of receipts over expenditures would be devoted to educational and charitable purposes. From this class of dyes the Alliance has accumulated a fund of \$1,314,315.59, which is in cash and Government securities, and has on hand 499,566 pounds of dyes of considerable value.

"It is considered essential by those familiar with the dyestuff situation that some other arrangement for the continued importation of the reparation dyes should now be made in order that the consumers may avail themselves of this low-priced source of supply and thus be protected against the recurrence of the abuses of the German dye monopoly, of which certain evidences are already obvious to those connected with the consuming trades.

### **U. S. MAY HAVE TO BUY REPARATION COLORS IN OPEN MARKET**

"I have urgently recommended to the Department of State on several occasions that no association or corporation under private management should perform these services, even though it be done without profit and solely in the interest of the trades. I have urged that the work be done by a Government Department, preferably the Tariff Board, but have each time been met by the statement that neither the Tariff Board nor any other department has the funds, organization nor authority to do the work. If these services are not performed, the supply of reparation dyes for the United States will cease and



they will be apportioned among the Allied or Associated Governments, or revert to the German manufacturers, who will be in position to sell them here through their agents at excessive prices.

"Although it is evident that the Department of State terminated its arrangement with the Alliance because of the pressure from the present or former agents of certain of the German manufacturers constituting the Interessens Gemeinschaft, nevertheless it is now understood that these same agents are now making representations to the State Department for the purpose of securing such reparation dyestuffs as that department might secure and are attempting to re-establish in the United States the monopoly which the I. G. enjoyed prior to the war.

#### TELLS OF FORMER ATTEMPT

"In the latter part of last year a similar attempt was made when the same German agents, or some of them, proposed that an agreement be entered into between the United States Government and eight of the largest German dye concerns which would give those concerns the exclusive right to the distribution of German dyestuffs in the United States through their own agents. This proposal was submitted to the Dye Advisory Committee of the War Trade Board Section of the Department of State, which advised the rejection of the proposal for the reasons, among others, that the plan suggested would result in a monopoly, owing to the fact that the German manufacturers referred to were all members of the I. G. and that such an arrangement would be against general public policy and particularly against the interests of American consumers of dyestuffs.

"At a meeting of the Board of Directors of the American Association of Woolen and Worsted Manufacturers held on December 6 I informed the Board that it had been intimated that the Department of State would wish to terminate the arrangement, and explained the situation which existed. The Board thereupon adopted a resolution which approved the supervision of the importation of these dyes by a Government agency, or if that was not practicable that it should be entrusted to the Textile Alliance, Inc., or some other similar non-profit organization of the consuming trades. A certified copy of that resolution was sent to the Department of State, and a copy is enclosed herewith.

"At a meeting of the Board of Directors of the Alliance held on December 8, 1921, a resolution was adopted to the effect that the Alliance should oppose all efforts to interfere with or stop the importation of these reparation dyes and that it should present the situation to the various associations and consuming interests in order that they might be given an opportunity to immediately make proper representations for the continuance of the importations of these dyes through contact with members of Congress, governmental departments, newspaper publicity, and such other means as might be available to the officers of these associations. A copy of the preamble and the resolution is attached to this letter.

"A report was made by Andrew C. Imbrie, a director of the Alliance, to the National Association of Finishers of Cotton Fabrics, the association which he represents upon the Board, at a meeting held on the fourteenth day of December, 1921 after which a resolution was adopted recommending the continuation of the work of the Alliance and expressing its desire that the Department of State should intimate to the Reparation Commission that it will be agreeable to the United States Government to have the commission deal directly with the Textile Alliance, Inc., in its private capacity, or if such definite recommendation cannot be made, then the Reparation Commission be requested to continue to deal exclusively with a non-profit retaining organization of dye consumers. A copy of that resolution was sent to the Department of State, and a copy is herewith enclosed.

"Through their own nominees on our Board of Directors, the American Association of Woolen and Worsted Manufacturers, the National Association of Finishers of Cotton Fabrics, and other individuals who are largely interested as consumers, have requested the Alliance to continue this work, it is still doubtful whether it has such a right until after a majority of the Board of Directors shall express the sentiment of the various associations which they represent.

"It is urgent that your association should express its opinion as to whether it approves of the Textile Alliance, Inc., or some other non-profit making association of the consuming trades securing desirable types of reparation dyes, which are available to the United States and thus providing for a continued source of supply at reasonable prices, or permit the option which the Reparation Commission has given the United States to lapse and the dyes be apportioned among the Allied and other associated powers, or revert to the German manufacturers, thus permitting them or their agents to regulate prices with the assurance that no non-profit association is able to make lower quotations."

The foregoing is the substance of the letter which was signed by Albert M. Patterson, president of the Textile Alliance, Inc. The enclosures accompanying the letter were as follows:

#### WOOLEN AND WORSTED MEN AGAINST ALLOWING OPTION TO LAPSE

Copy of a resolution adopted at a meeting of the Board of Directors of the American Association of Woolen and Worsted Manufacturers at a meeting held in New York, Tuesday, December 6, 1921:

"Whereas, It has come to our attention that a change is contemplated in the methods of dealing with the importation of reparation dyes from Germany, it is

"Resolved, That the continued importation of these dyes is essential and necessary to the woolen and worsted industry, and it is further

"Resolved, That supervision of these importations by a Government agency should be continued, or, if that is not practical it should be entrusted to the Textile Alliance,

Inc., or other similar non-profit making organization of the consuming trades.

(Signed) "J. J. NEVINS, Secretary."

#### ALLIANCE APPEALS TO MEMBER FIRMS FOR SUPPORT

Excerpt of minutes of meeting of the Board of Directors of the Textile Alliance, Inc., held on December 8, 1921:

"The president of the company advised the board that on December 2 he had been called to Washington for a conference with F. M. Dearing, Assistant Secretary of State, and that Mr. Dearing advised that the Department of State feels that there is not sufficient legal ground for the existing arrangement between the Department of State and the Textile Alliance, Inc., and stated that it is the desire of the Department to terminate the arrangement under which the Textile Alliance, Inc., is importing and distributing reparation dyestuffs and to be relieved of all responsibility in connection therewith; that it is not the desire of the Department of State to take any drastic action that will preclude the possibility of consumers in this country obtaining in the future, as in the past, reparation dyestuffs at reasonable prices; that Mr. Dearing made it plain that the desire of the Department to terminate the arrangement is based purely on legal grounds, and stated that the Department is in no respect dissatisfied with the Textile Alliance, Inc., as the relationship between the Department and the Textile Alliance, Inc., has been pleasant and entirely satisfactory, and it is the opinion of the Department that the operations of the Textile Alliance, Inc., have been generally satisfactory to the trade; and Mr. Dearing stated further that it is his opinion that there is no probability of an arrangement being perfected under which reparation dyestuffs might be imported and distributed by the Treasury Department, Tariff Commission or other governmental department. Mr. Dearing was advised that the Textile Alliance could continue the purchase, importation and distribution of reparation dyestuffs in its private capacity, provided the Department of State would indicate to the Reparation Commission its approval of the continuance of sales to the Textile Alliance, Inc., of reparation dyes.

"It was the opinion of the President that the desire of the Department of State to be relieved of financial responsibility and to cancel the existing arrangement between the Department and the Textile Alliance, Inc., is due to activity on the part of certain agents for German dye manufacturers.

"Instructions were requested as to whether or not the Textile Alliance, Inc., shall continue the importation and distribution of reparation dyes, if the opportunity presents itself, without direct governmental support and sanction or agreement for governmental supervision, and if so should the Textile Alliance, Inc., carry its advocacy to the point of creating antagonisms and jeopardizing its relationship with the Department of State. On motion, duly seconded, it was

"Resolved, That it is the sense of this meeting that the

Textile Alliance, Inc., should preserve at all costs its friendly relations with the Department of State, but that for the protection of the dye consumers in the United States it should actively and energetically oppose all efforts to interfere with or stop the importation and distribution of reparation dyes; that it should present the situation to the various associations and consuming interests in order that they may be given an opportunity to immediately make proper representations for the continuance of the importation of these dyes and that such representation should be effected through contact with members of Congress, governmental departments, newspaper publicity, and such other means as may be available to the officers of these associations. It was further

"Resolved, That Franklin W. Hobbs and Henry B. Thompson, together with one member to be named by the Silk Association of America, be named a committee with full power to make use of the services of Messrs. Coudert Brothers, counsel for the Textile Alliance, Inc., and the services of Chas. H. Stone, agent, and E. A. Macon, secretary, of the Textile Alliance, Inc., in the conduct of this work."

#### COTTON FINISHERS ASK THAT ALLIANCE MAY CONTINUE SERVICE

Copy of resolution adopted by the National Association of Finishers of Cotton Fabrics at a meeting held in New York, Tuesday, December 13, 1921:

"Whereas, The National Association of Finishers of Cotton Fabrics learns that, at a recent conference between the officers of the Textile Alliance, Inc., and the representatives of the Department of State, it was intimated that the Department wished to terminate the present arrangement with the Alliance by which German reparation dyes have been imported and distributed to American consumers.

"Whereas, Having experienced the satisfaction of dealing with a disinterested and officially authorized agency operated for the benefit of consumers and under no necessity of making a profit, the members of this Association cannot regard with equanimity the possibility of being again subjected to the abuses, unreasonable exactions and deceptions which were practised prior to the war by the agents or representatives of the German dyestuffs monopoly; therefore, it is unanimously

"Resolved, That this Association, including in its membership sixty-two plants engaged in the business of bleaching, dyeing and printing silk and cotton piece goods, desires to record its approval of the service rendered by the Textile Alliance, and its conviction that such an agency should continue to function in the interests of dye consumers. Also be it

"Resolved, That in the event of the Department's deciding to terminate the present arrangement and if no other governmental department is in a position to assume responsibility for these transactions, this Association earnestly hopes that the Department of State will feel justified in intimating to the Reparation Commission that



it will be agreeable to our Government to have the Commission deal directly with the Textile Alliance in its private capacity. If the Department, for any reason, cannot make so definite a recommendation, then we urge that the Commission be specifically requested to continue

to deal exclusively with a co-operative non-profit retaining organization of dye consumers. It is further

"Resolved, That the secretary of the Association be directed to forward the foregoing statement to the Department of State at Washington."

## Italian Dye Industry Makes Slow Progress Against Heavy Odds

By RAFFAELE SANSONE

Genoa, December 5.  
Special to The REPORTER.

THE demand for dyestuffs, although still limited owing to the crisis prevailing in the textile, paper and leather industries, was very fair because of the many manufacturers preparing stocks in the anticipation of increased activity later on. The demand for wool colors, owing to the greater demand for dyed woolen goods, became more pronounced, though nothing in comparison to what had been anticipated.

Germany, observing that the continued fall in the value of the mark was causing a growing tendency on the part of the buyers to speculate—the latter making it a practice to hold up orders until the last possible moment; and apprehending a further decline, proceeded to place special export prohibitions on German goods which had not been ordered and paid for in Italian lire. This state of affairs did not affect the prices of artificial dyestuffs during November; but did influence, however, those chemicals which were urgently needed, raising the prices slightly.

The Italian dyestuff industry itself went through diffi-

cult moments, and matters were ill for the *Unione Produttori e Consumatori Materie Coloranti Artificiali* (Union of the Producers and Consumers of Coal-tar Colors), the formation of which was told of in The REPORTER of September 26. This association, which had its headquarters at Milan, was forced to liquidate, being no longer in a position to continue its useful work. All old and new dyestuff firms had great difficulty in competing against some of the German reparation products, and against other imported products from Germany and other countries. This, in spite of the Italian import prohibitions. The other foreign products had, as usual, the monopoly of the market, owing to the difficulty which is still experienced in obtaining formulae, plants, chemists and operatives. During its recently completed fiscal year the color works known as *Fabbriche Italiane Materie Coloranti Bonelli* lost 2,000,000 lire on a capital of 30,600,000 lire.

These conditions are, however, no novelty, and despite them there was a steady, if slow, progress in the Italian color and intermediates industries. This can be demonstrated by the following facts:

TABLE OF COMPARATIVE VALUES REFERRED TO ON PAGE 29

100 Kilos	November (Lire)	November (Dollars)	October (Dollars)
Naphthol Yellow .....	50,000- 70,000	2,040-2,857	2,083-2,916
Auramine .....	70,000- 80,000	2,857-3,265	2,916-3,333
Orange II .....	30,000- 35,000	1,224-1,428	1,250-1,458
Nigrosine, water soluble .....	30,000- 40,000	1,224-1,632	1,250-1,666
Nigrosine, soluble in alcohol .....	35,000- 40,000	1,428-1,632	1,458-1,666
Sulphur Black .....	7,000- 10,000	285- 408	291- 416
Acid Black .....	35,000- 40,000	1,428-1,632	1,458-1,666
Direct Black .....	35,000- 40,000	1,428-1,632	1,458-1,666
Chrome Black .....	40,000- 45,000	1,632-1,836	1,666-1,875
Methylene Blue .....	80,000-100,000	3,265-4,080	3,333-4,166
Direct Blue .....	25,000- 30,000	1,020-1,224	1,041-1,250
Sulphur Blue .....	45,000- 50,000	1,836-2,040	1,875-2,083
Malachite Green .....	80,000-100,000	3,265-4,080	3,333-4,166
Acid Green .....	60,000- 70,000	2,448-2,857	2,500-2,916
Direct Green .....	50,000- 70,000	2,040-2,857	2,088-2,916
Bismarck Brown .....	40,000- 50,000	1,632-2,040	1,666-2,088
Fuchsine Crystals .....	70,000- 80,000	2,857-3,265	2,916-3,333
Eosine .....	60,000- 70,000	2,448-3,265	2,500-3,333
Ponceaux .....	35,000- 45,000	1,428-1,836	1,458-1,875
Methyl Violet .....	70,000- 80,000	2,857-3,265	2,916-3,333

The imports of benzol, toluol, and xylol reached 105 tons during the first six months of this year, against 141 tons in 1920, and 1,064 tons in 1919, during the same period; besides 45,984 of raw benzine imported during the same six months. The supplies of such first products came principally from the United States, although in 1919 they had come principally from England (986 tons from England and 77½ tons from the United States).

The following importations were also noted during the first six months of this and preceding years: About 1 ton of benzoic acid was imported, against 6½ tons in 1920, and 2½ tons in 1919; 67 tons of nitrobenzene, against nothing during preceding years; 23½ tons of aniline and its salts (exports 45 tons), against nothing during the preceding years; the imports of acetone only reached 9 hectolitres, against 320 in 1920, and 8,923 tons in 1919; this product no longer coming from the United States (which exported to Italy 309 hectolitres in 1920, and 8,923 hectolitres in 1919). The exports of this product from Italy reached 1,461 hectolitres, against 54 hectolitres in 1920 and 12 hectolitres in 1919.

From the above it will be seen that the enforced manufacture of dyes and dyestuff intermediates brought about in Italy a certain production of aniline and its salts which was partly sold to the dye works for the production of Aniline Black, was partly sold to the color works for producing colors, and was partly exported. In this way Italy came to export more aniline oil and salts than were imported. With acetone the same took place.

*Prices of Coal-Tar Colors.*—The quotations given in the Table (p. 28) per 100 kilos in lire and dollars, show the differences brought about by the fluctuations in foreign money, which changed in November the United States dollar from a value of 24.50 lire to a value of 24 lire, and the English pound sterling from 96 lire to 93 lire. The German mark fell from 0.12 lire to 0.08 lire, and even lower, rising slightly after this.

*Dyewood Extracts.*—The demand for extracts was still good. Logwood extract was, however, the product mostly demanded, and this principally for printing cotton fabrics, dyeing silk fabrics and manufacturing ink. In wool dyeing it was mostly substituted by acid blacks, coming from Germany and other countries. The demand on the part of textile concerns, paper works and tanneries for other dyewood extracts was still small, owing to the difficulties through which these are passing.

*Mordants, Assistants, Dyehouse Products, Etc.*—The demand for mordants and other dyehouse products, besides coloring matters, was very fair, and dearer German quotations contributed in raising some of the prices. Some of the changes noted during November being as follows per metric ton on the Milan market: Acetate of alumina rose from 125 lire to 160; chrome alum remained at 300 lire; bichromate of potash remained at 600 lire; ferrous sulphate remained at 50 lire; copper sulphate remained at 250 lire; tartar emetic remained at 1,300 lire; aniline oil remained at 1,000 lire; white refined glycerine rose from 650 lire to 850; glucose, 45 deg. Be., remained at 260 lire; hydrogen peroxide remained at 210 lire; tannic

acid, 60 per cent, remained at 2,000 lire; tartaric acid crystals remained at 1,075 lire; acetic acid, 30 per cent, remained at 300 lire; hydrochloric acid, 20 to 21 deg. Be., remained at 32 lire; formic acid rose from 800 lire to 900; lactic acid, 80 per cent, remained at 400 lire; alum fell from 140 lire to 135; ammonia, 22 deg. Be., remained at 155 lire; bisulphite of soda, 32 deg. Be., remained at 45 lire; chlorate of potash fell from 370 lire to 345; chloride of ammonia remained at 450 lire; powder remained at 90 lire; nitrite of soda remained at 300 lire; yellow prussiate of potash remained at 1,300 lire; yellow prussiate of soda remained at 900 lire; caustic soda, 76 to 78 per cent, rose from 280 lire to 340; silicate of soda, 140 deg. Tw., remained at 100 lire; sodium rose from 280 lire to 325; logwood extract remained at 1,000 lire; yellow dextrine remained at 425 lire; white dextrine remained at 430 lire; farina (potato starch) remained at 340 lire; Kordofan gum remained at 500 lire; Indigo, 25 per cent, remained at 2,000 lire; betanaphthol rose from 1,200 lire to 1,800; industrial castor oil remained at 580 lire; zinc powder remained at 550 lire. The dollar was worth, at the time of these quotations, 24 lire.

#### NATIONAL ISSUES 1922 "DYER'S FORMULAS" FOR USE WITH SPRING SEASON COLOR CARD

In line with its policy of providing a helpful and personal service for dye users, the National Aniline & Chemical Company has again come to the fore with a series of instructions for producing hues standardized by the Textile Color Card Association of the United States. The present edition of "Dyers' Formulas" is a thirty-two page booklet, uniform with others of this series, for use in connection with the 1922 Spring Season Shade Card of the Association, and copies may be obtained by addressing any of the company's branches, or the main office at 21 Burling Slip, New York City.

The matching of these colors, in the laboratories of the company, on cotton, wool and silk, required the preparation of thousands of experimental formulas, and the results now offered to the trade are the outcome of painstaking and elaborate elimination trials which would be beyond the power and resources of many dye users to carry out in their own works. Great care has been exercised in the selection of the several dyes named, and the company states that dyers may have confidence, if recommendations are closely followed, that proper results will be obtained.

Seventy-one formulas are given for silk, seventy-one for cotton, and eighty-five for wool. In the case of each, the quantities of dyes and assistants mentioned are for 100 pounds of material. For cotton colors two methods are given, one for the use of direct dyes on cotton, for light shades and for medium and deep shades; and one for basic dyes on cotton, for light shades and for medium and full shades.

"Dyer's Formulas," should find favor with the dye user and a place on his laboratory shelf.





## MEN OF MARK in the DYESTUFF FIELD

**M. L. CROSSLEY**  
Chief Chemist

**The Calco Chemical Co.**  
Bound Brook, N. J.

**M.** L. CROSSLEY was born July 3, 1884, in Saba Island, Dutch West Indies, of American parents. He received his early education in the Dutch West Indies Academy, and later completed his secondary school education in the United States. He was graduated from Brown University in 1909 with the degree of Bachelor of Philosophy, completing the four years' course in three years. Continuing graduate study at Brown, he received the degree of Master of Science in 1910 and the degree of Doctor of Philosophy in 1911.

During the period of 1909-1911 he was Instructor of Chemistry at Brown under Prof. John Howard Appleton. It was through Professor Appleton that he first became interested in the chemistry of dyes, being associated with him for two years in research on the relation of constitution to color in dyes of the anthraquinone series. With Professor Appleton he made an exhaustive study of vat dyes, and simultaneously conducted an investigation in biological chemistry on the relation of Creatinine to body metabolism. As a result of his work and training, he is prepared to teach either biology or chemistry.

Leaving Brown, he became Associate Professor of Organic and Biological Chemistry at William-Jewell, Liberty, Missouri, during the period of 1911-1913; was Associate Professor of Organic Chemistry at Wesleyan University, Middletown, Connecticut, 1913-1914, and acting head of the Department of Chemistry at Wesleyan, 1914-1918. In July, 1918, he gave up teaching to assume his present position as Chief Chemist of the Calco Chemical Company.

His research work during the years 1911-1918 was in several fields, particularly in the relation of constitution to color, the effect of toxins on nerve metabolism, and the relation between chemical constitution and physiological properties.

He was a member of the Eighth International Congress of Applied Chemistry, and is a Fellow of the American Association for the Advancement of Science, a member of the American Chemical Society, of the Society of Chemical Industry, and of the Societe de la Chimie et Industrie. He was President of the Connecticut Valley Section of the American Chemical Society 1916-1918, and is the author of several papers on scientific and educational subjects.

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the **AMERICAN DYESTUFF REPORTER** by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

**D. Q.—Question:** We are anxious to secure a formula for dyeing Aniline Black on cotton and silk piece goods without tendering the material. Any information you can give us will be greatly appreciated.

**Answer:** Make up two solutions, as follows: (a) 132 pounds aniline salt in 55 gallons water; (b) 55 pounds chlorate of soda and 12 pounds of copper sulphate boiled in 55 gallons of water. Equal parts of (a) and (b) are used for the first bath and enough water added to bring the solution up to 6 deg. Be. The goods are then run cold four times. They are then put in the aging box and aged for an hour. The air should be very moist in this operation. The goods are then after-chromed with bichromate of soda or potash, on the basis of about 4 pounds of the chemical per 500 yards of goods. They are run through four times, then soaped and rinsed.

**F. E.—Question:** What is the cause of dyed materials changing their tone of color in artificial light, and how can it be prevented?

**Answer:** The reason lies primarily in the properties of the individual dyes used in making the original shade. A good example is that of Acid Violet 4B. This dyestuff has a shade which does not correspond to any simple color of the spectrum (monochromatic light), but is the resultant of a number of blue rays and certain red rays. The artificial light, being deficient in blue and green rays, causes the loss of these in every object illuminated, and hence the red and yellow effects are intensified and the material dyed with Acid Violet 4B becomes very much redder under artificial light. Almost every dyestuff is affected to a greater or lesser degree, but there are a few that only seem to become flatter and consequently the color tone appears almost unchanged. Bright, intense blues and greens, like Patent Blues and Acid Greens, appear brighter and greener, and yellows are intensified. Bearing these facts in mind, the dyer must use combinations in which these effects offset one another, so that the only effect under artificial light will be that of dulling of shade without alteration of tone. As we naturally expect a duller shade with less illumination, we are then not conscious of any alteration in the color

In many cases color changes under artificial light are of no consequence, but when trimmings are expected to match dress goods, and when the design of a carpet depends on color harmony, it would be a fatal defect to have a change take place in artificial light. The selection of the proper dyes in this case is even more a matter of skill on the part of the dyer than the matching of the original shade.

**E. R. S.—Question:** In dyeing worsted cloth with unresisted silk stripes with chrome colors, we sometimes clear the white silk with hydrosulphite or blankit. Is this always a safe thing to do, or will it injure the color of the worsted?

**Answer:** The action of hydrosulphite, or its purer variety, blankit, toward colors is like any other chemical reaction; but on account of the stain on the silk being light in shade and only loosely affixed, it seems to expend itself on the silk first before it affects the wool. It may be possible, by using a small amount of hydrosulphite and a temperature not over 130 deg. Fahr., to carefully regulate matters so the action is stopped as soon as the silk is cleared. Even then a slight amount of the wool color will have been stripped from the surface of the fibers, but the amount will be too slight to be noticeable. If the action is prolonged by the use of too much hydrosulphite or too long time or high temperature, the wool will suffer proportionately. This refers to color only. There is practically no tendering of the fiber, and if all traces are washed out there will be no later action.

**I. D.—Question:** What is the most practical way of dyeing silk and cotton hosiery in two-color (heather mix) effects that will stand washing?

**Answer:** The one really practical way is first to boil off the goods, and then dye the hosiery in a cold, concentrated bath with sulphur colors in the presence of 5 per cent of glue. After washing, the silk will be white and should be cross-dyed with such acid dyes as best resist washing. This method gives the most brilliant silk effects and will wear much longer than any dyeings made with direct or developed colors.

**L. S. T.—Question:** What class of dyes furnishes the best wood stains for high-grade work?

**Answer:** As water stains will raise the grain of the wood and make sandpapering necessary before varnishing, and as oil stains will always interfere with the proper drying and hardening of the varnish, we believe spirit stains to be the most practical. A spirit stain should be made with denatured alcohol, a small quantity of shellac and dyestuffs that dissolve without residue. Such a stain will penetrate far below the surface and, when protected by varnish, be resistant to light and water to a degree that would hardly be expected.



## Review of Recent Literature

*Presence of Acids in Cloth.* Thomas Hadfield; "The Textile Manufacturer," November 15, 1921, p. 340.

Author states that the question of acid in cloth is a very important one, and also one on which many manufacturers are very slack. The quality and finish of many cloths could be improved if this matter were properly looked after. The acids finding their way into cloth during manufacture are chiefly sulphuric and hydrochloric acids; but other acids are often found in cloths through the ingredients used in sizing, bleaching, dyeing and finishing. If the materials used in the various processes of manufacture were tested periodically for impurities, much trouble would be avoided in finishing, and ultimately there would be fewer complaints to the seller of the finished cloths.

The author declares that all sized fabrics, either light, medium or heavy, have at one period of their manufacture a varied amount of acid present, and even minute traces of acid in the presence of moist air will cause defects in the fabric; and these defects become more obvious when the fabric is made into wearing apparel. Very delicate shades of silk may be injured by long contact with other cloths containing acids. Metallic articles are also soon tarnished. Sulphuric acid remains for years, continually regenerated by the moisture of the air, and slowly causes destruction of the fabric. Fabrics made from vegetable fibers, as cotton, linen, jute, ramie, etc., are naturally slightly acid, as the fibers when tested in their pure state denote acidity with Congo-red. Animal fibers are generally alkaline when in the pure state.

From tests made over a considerable period, varying from three weeks to three years, it has been found that heavily sized cloth gains in acidity more than pure-sized cloth, and the destructive action is more evident. Details of these tests, together with results, are given. Conclusions were that, as regards the effect upon the fabrics of the presence of mineral acid, even in traces the acids weaken the cloth and make it less able to resist friction and climatic conditions. The effects are much more strongly marked with sulphuric acid than with hydrochloric acid. The former acid may ultimately effect a complete disintegration of the fabrics. Further, the conversion of the cellulose into hydrocellulose is not necessarily accompanied by any diminution in the amount of the hydrating acid present. Cloths dyed with fugitive colors are soon affected, reducing the value of the cloth, which has ultimately to be sold at a loss.

To test for free acid, 2 grams of the cloth are weighed, cut into small pieces and exhausted with warm water; the extract is titrated with deci-normal caustic soda, and as an indicator phenolphthalein is used. In some cases repeated extractions are necessary to get out all the acid.

In order to confirm the volumetric analysis it is necessary in some cases to have a precipitation test with barium chloride.

Congo-red is chiefly used as a test, as its color is only changed by free mineral acids, and not by alum having an acid reaction, and this test is sufficient for any class of cloth, as the reaction is so sensitive; any perceptible change denotes the presence of acid.

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*Some Uses of Hypochlorites in Textile Mills.* Rideal and Evans, "Journal of the Society of Chemical Industry."

Numerous bleaching methods have been proposed where the action is accelerated by the addition of some form of acid to the bleaching solution. Outside of the paper industry these have been little used, presumably because the reaction is so much more rapid and gets "out of control."

Such methods do appear, however, to have a use in textile mills where bleach is used for purifying water or similar purposes. Hypochlorites are largely used for bleaching, sterilization of drinking water, treatment of water for textile finishing to prevent growth of algae and consequent stains, and addition to water of swimming pools.

Oxidizing agents in general react more powerfully in the presence of acids, and this observation is checked by electrical measurements. Chlorine in acid solution ranks with the most powerful oxidizing agents and in alkaline solution with some of the weaker. It is not generally known that a comparatively slight change in the acidity of a water will make a marked change in the oxidizing activity of the hypochlorite added to it.

The suggestion is made that alkaline water should be treated with acid materials at least to render it neutral before applying hypochlorites as germicides. It is advised also to neutralize the alkalinity which is always found in commercial hypochlorite before using it on contaminated water.

The fact is noted that bleaching powder bought in retail stores is always much decomposed, and usually in such a way as to become more alkaline. If it has lost one-half its strength twice as much bleach will not do the same work, because its action is retarded by the extra alkali. If sanitary arrangements in a community are not of the best, such chloride of lime may be a real menace, as it does not have the intended effect, although still having the confidence of the user. In a case cited a paper carton that was found on sale in a store contained only traces of available chlorine.

Chloride of lime decomposes seriously on a large scale when stored for a long time or under unfavorable conditions, and may introduce similar though less pronounced irregularities into practical bleaching.

It is suggested that whenever possible sodium hypochlorite solution be used in place of bleaching powder; and, still better, that chlorine itself be stored as liquid

chlorine. There is no loss or uncertainty so long as it is kept in the cylinder, and when made up it can be used at once before serious decomposition takes place.

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*New Process of Scouring and Bleaching.* British Patent 170,534, issued to R. W. R. Mackenzie, E. H. Robinson and Morris Fort.

Relates to the purification of vegetable fibers by means of ordinary methods of scouring and bleaching, assisted by extraction of the goods with organic solvents. A safer and easier removal of more substantial amounts of various impurities of natural and foreign origin than by the processes hitherto proposed is effected, including not only oil, fat and wax, but resinous matter, oxidized or partially oxidized oils, coloring matters and nondescript organic and mineral matter. It is particularly valuable when applied to fabrics containing particles of unremoved woody matter, seed, tick or shell, old oil stains, unsaponifiable oils and waxes derived from size which render fabrics difficult to bleach by ordinary scouring and bleaching methods.

The patentees have found that organic solvents boiling at higher temperatures than water are better extraction agents than volatile solvents of lower boiling point. Linen and cotton yarns and fabrics in the damp or wet state can be extracted with organic solvents without drying previous to extraction if solvents of a sufficiently high boiling point are applied at a high temperature equal to or above the boiling point of water. Also solvents at a higher boiling point than water compared with similar volatile solvents—that is, organic solvents of similar chemical series or of related type, but of lower boiling point than water—are more efficient extraction agents when applied hot or boiling for the extraction of mixed impurities of natural or extraneous origin, in the form of a crude wax from linen and cotton yarns and fabrics. Moreover, if this extraction of mixed impurities is intended to aid subsequent scouring, bleaching and finishing of the yarns and fabrics, greater assistance is given by the use of higher boiling organic solvents.

The value of the process for removing impurities of foreign origin is also considerable. Old oil stains, from spinning or weaving, or associated with the presence of seed or shell, especially where, as frequently happens, the yarns of fabrics have been gassed or singed, or where yarns have been chemicked without the oil being properly removed first, or even heated or boiled without the oil being completely removed, may present themselves by reason of oxidation or other changes, as stains difficult or impossible of removal by ordinary volatile solvent extraction. The brown stains which are frequently left after removal of oil, fat and wax are extremely difficult to bleach out afterwards. Hot solvent treatment in bulk is far quicker and more effective than ordinary scouring and bleaching or hand treatment, and gives superior results in the removal of difficult stains of this type; likewise, partly oxidized oils, resinous matter and unsaponifiable waxes occurring, for example, as foreign im-

purities in sized yarns and fabrics are more quickly and perfectly removed.

The apparatus may be the technical equivalent of a Soxhlet extractor readily adapted for employing hot or boiling solvent alone or in conjunction with hot solvent vapor.

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*Artificial Silks.* Joseph Foltz, translated from the French by T. Woodhouse. 5 x 8 1/4, illustrated, 240 pp. London. Sir Isaac Pitman & Sons, Ltd.

The second edition of this work has been translated and new material has been added to fill the present volume, which covers the latest developments of the manufacture of artificial silk industry. The contents are: I. Introductory; II. Cellulose; III. Origin of Artificial Silk; IV. Chardonnet Artificial Silk; V. Despeissis Artificial Silk; VI. Solutions and Apparatus for Mixing; VII. Spinning Mill; VIII. The Cleaning of Spinnerets; IX. Filtration of Water; X. Drying, Humidification, and Ventilation; XI. Winding, Twisting, Reeling and Counting; XII. Waste; XIII. Viscose; XIV. Luster Artificial Silk; XV. Recovery of By-products; XVI. Solution of Cellulose; XVII. Precipitating Liquids; XVIII. Spinning of Artificial Silk; XIX. Other Imitations of Natural Silk; XX. Organization of Staff; XXI. General Notes; XXII. Distinctive Characteristics; XXIII. Dyeing; XXIV. Conversion of Cellulose; Index.

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*Principles of Worsted Spinning.* Howard Priestman. London: Longmans, Green & Co. 15s. net.

This is the second edition of what has been a highly appreciated work, explaining the principles of worsted spinning. It deals in order with materials and qualities, spindle theories, drafting and ratch, drawing, cone drawing, spinning, automatic doffers, dry-spun yarns, twisting, winding, reeling and warping, defects and remedies. In large part the book remains very much like the first edition, but a new chapter has been added on automatic doffers, in which the author reviews the conditions to be satisfied in perfecting the mechanical doffing of spinning frames. He describes the leading principles and mode of action of the several types of automatic doffers which are now in use, and also deals in limited measure with the "Leeson" type of winding frame.

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*British Patent 166,297*, issued to F. W. Atack and J. Anderson, February 11, 1920.

Patentees describe a process for the manufacture of vat dyes in which B-Aminoanthraquinone and caustic potash are heated with a non-hydroxylic solvent or diluent, such as aniline, naphthalene, etc., at or near the boiling point. Impure anthraquinone-1:2:2':1'-NN'-dihydroazine, which dyes cotton green from a hydrosulphite vat, is obtained when aniline is used and the mixture is boiled under a reflux condenser, but when naphthalene is used in presence of an oxidizing agent, such as potassium nitrate, and the mixture is boiled under a reflux condenser, pure Indanthrene Blue is obtained.



## Recent Patents

### Green Acid Dyestuffs Containing Chromium, and Process of Making Same

(1,394,823; October 25, 1921)

ARMIN GROB (assignor to Society of Chemical Industry in Basle, Basle, Switzerland)

Process described consists in treating with chromating agents the ortho-oxy-azo dyestuffs derived from mononitro-ortho-oxy-diazo compounds and 2-aminonaphthalene compounds which are not substituted in their 1-position and are capable of combining with a diazo group in an acid medium at their 1-position chroming agents which are  $\text{Cr}_2\text{O}_3$  compounds.

### Green Dyestuff, and Process of Making Same

(1,396,483; November 8, 1921)

VICTOR VILLIGER and HEINRICH VON KRANNICHFELDT

Process consists in producing a green product by heating alpha-naphthaquinone in the presence of water until it is substantially decomposed, and treating the yellow product first formed with a non-alkaline reducing agent.

### Artificial Silk

(1,398,525; November 29, 1921)

ROBERT DENIS LANCE (assignor of one-half to Cecil Shrager, London, England)

Claim is made for an artificial silk comprising a cellulose ester having a metallic resinate with a high fusion point, said resinate not exceeding 20 per cent.

### Clothometer Gage

(1,398,565; November 29, 1921)

JOHANNES TH. PEDERSEN (assignor by mesne assignment to the Measuregraph Company, Missouri)

Claims a housing for a measuring machine, having a guide slot through which the cloth is pulled when measuring same, in combination with a ledge adjacent to the slot, and projecting from the rear side of the housing, and means carried on the ledge—and removed from the side of the housing—for marking the edge of the fabric.

### Machine for Mercerizing Hose and Other Knitted Fabrics

(1,400,159; December 13, 1921)

ALRED ERNEST HAWLEY, PERCY FIELD CROSLAND and FRANCIS GRAHAM DIXON

Means are described for mercerizing and washing hose and similar knitted or woven goods, said means comprising stretching forms or plates on which the goods are mounted, and a series of pairs of rollers between which pairs of rollers the forms are passed, each suc-

ceeding pair of rollers being driven at a greater peripheral speed than the preceding pair, whereby the goods on the forms are firmly held or stretched while being subjected to the action of the mercerizing agent.

### Process for Degumming Textile Fibers

(1,397,875; November 22, 1921)

JACOB MEISTER

This describes a process for degumming textile fibers through the action of enzymotic substances which comprises preliminarily treating the fibrous material in a diluted alkaline bath containing borax and ammonia, and then treating said material in a second bath at a moderate temperature with an ammoniacal enzymotic solution which contains borax and sodium chloride, the material finally rinsed.

### Apparatus for Chlorine Control

(1,400,393; December 13, 1921)

JAMES W. VAN METER

Claims an apparatus for chlorine control comprising a chamber adapted to contain a liquid, a transparent vessel below the chamber and adapted to be fed with liquid therefrom, a receiving vessel within the transparent vessel; means for supplying chlorine to said inner vessel, which has a bleeder port through which chlorine exudes in drops into the liquid.

### Dyestuff, and Mode of Producing It

(1,399,014; December 6, 1921)

EADY HART (assignor of one-half to Isabella Jessie Stewart, Ballarat, West Australia)

Claims an improved dyestuff consisting of the product obtained by immersing a chromogenic vegetable substance divided into small parts in a solution containing sodium carbonate and lime, boiling the mixture and filtering the resultant liquor.

### Artificial Textile Fabric, and the Process for Its Manufacture

(1,394,270; October 18, 1921)

JACQUES EDWIN BRANDENBERGER

Describes a process comprising the steps of emulsifying a viscous solution and a gaseous fluid which is inert to said solution, and expressing the resultant emulsion through a drawing plate to produce an article containing an internal series of bubbles of said fluid.

### Process for the Treatment of Vegetable Fibers

(1,400,380; December 13, 1921)

CHARLES SCHWARTZ (assignor to Societe Gillet et Fils, Lyon, Rhone, France)

This is a process for the treatment of vegetable fibers, for the purpose described, consisting in impregnating the fiber with a solution of an amylaceous substance, drying the fiber, passing the same into concentrated nitric acid.

and precipitating the nitrated amylaceous substance upon the fiber by washing.

#### Process for the Treatment of Vegetable Fibers

(1,400,381; December 13, 1921)

CHARLES SCHWARTZ (assignor to Societe Gillet et Fils, Lyon, Rhone, France)

Claim is allowed for the treatment of vegetable fibers, with a view to imparting to them the character of wool, both physically, as to feel, appearance and caloric quality, and chemically, as regards their affinity and absorbent capacity, said process consisting in fixing upon the fiber products resulting from the hydrolysis of proteic substances by the action of strong mineral acids thereon.

#### Production of M-Nitro-P-Cresol

(1,394,150; October 18, 1921)

CLARENCE G. DERICK, WALTER M. RALPH and LAWRENCE H. FLETT (assignors to National Aniline & Chemical Company, New York)

This describes the method of diazotizing p-toluidin which comprises dissolving about 107 parts of p-toluidin in about 265 to 290 parts of sulphuric acid (66 deg. Be.), diluted with about 400 parts of water, whereby the heat of dilution of the sulphuric acid is utilized in dissolving the p-toluidin, adding about 1,100 parts of water thereto, cooling the resulting solution and adding sodium nitrite.

#### Dyeing Machine

(1,397,860; November 22, 1921)

HOWARD M. DUDLEY

Describes, in a dyeing machine, in combination, a closed receptacle, a dyeing chamber within the receptacle and spaced therefrom, the dyeing chamber having a foraminous top and a foraminous bottom, a propeller chamber connecting the upper and lower chambers formed by the tops and bottoms of the receptacle and the dyeing chamber, a revoluble propeller within the propeller chamber, a series of openings connecting the side chambers formed by the sides of the dyeing chamber and the receptacle with the lower portion of the propeller chamber and a series of openings connecting the side chambers formed by the side of the dyeing chamber and the receptacle with the upper portion of the propeller chamber.

#### Process for Producing Wool-Like Effects on Cotton Fabrics

(1,400,016; December 13, 1921)

GUSTAV ADOLPH BOSSHARD (assignor to the Firm A.-G. Seeriet, Bleicherei, Filiale Arbon, Arbon, Switzerland)

Claim is made, in a process for producing wool-like effects on cotton fabrics, for the step wherein the fabrics are treated with nitro-sulphuric acid of 48.3 deg. Be., cooled down to at least 0 deg. Cent.

#### Fireproofing of Textile Fabrics and Other Porous Articles

(1,397,858; November 22, 1921)

THOMAS JOHN IRELAND CRAIG (assignor of one-half to Whipp Bros. & Tod, Ltd., Manchester, England)

Claim is allowed for the process of rendering fibrous or absorbent materials and the like less inflammable, which consists in first treating said materials with an aluminate of an alkali metal, then subsequently treating said materials with a solution containing sodium bicarbonate, and finally subjecting said materials to heat.

#### Process of Making Colored Nitrocellulose Compounds

(1,399,357; December 6, 1921)

LESTER J. MALONE (assignor to Eastman Kodak Company, Rochester, N. Y.)

Claims the process of making a colored nitrocellulose composition, which comprises the steps of dyeing the nitrocellulose fibers and then dissolving said dyed fibers in a nitrocellulose solvent.

#### Dyeing Machine

(1,400,417; December 13, 1921)

FREDERICK CARTER

This describes a dyeing machine comprising a receptacle, a T-shaped member supported above and extending into the receptacle and guides positioned at each end of the T-shaped member, whereby the material to be dyed may be guided through said receptacle.

#### Method of Manufacturing Fiber Products

(1,399,976; December 13, 1921)

GEORGE JAMES MANSON (Continuation of application serial No. 32,418, filed June 5, 1915)

Describes a process of manufacturing a fiber product which comprises, first, chipping sawmill waste, then grinding the raw chipped wood with water between closely spaced surfaces having a movement relative to each other, such surfaces being sufficiently far apart to permit at the narrowest point the presence of a plurality of fiber bundles therebetween, whereby a rolling separation is effected.

#### Process for the Treatment of Vegetable Fibers

(1,399,804; November 29, 1921)

CHARLES SCHWARTZ (assignor to Societe Gillet et Fils, Lyon, Rhone, France)

This is a process for the treatment of vegetable fibers with a view to impart to them the character of wool, both physically, as to the feel, appearance and caloric quality, and chemically, as regards their affinity and absorbent capacity for dyestuffs, said process consisting in impregnating the fiber with a solution of cellulose in concentrated nitric acid, and precipitating upon the fiber a slightly nitrated cellulose by washing with water.



**Dyeing Fibers, Threads or Fabrics**

(1,398,357; November 29, 1921)

JOHN FREDERICK BRIGGS and CHARLES WILFRED PALMER  
(assignors to American Cellulose & Chemical Manufacturing Company, Ltd., Delaware)

Describes a method of facilitating the dyeing of fibers, threads or fabrics of or containing cellulose acetate, which comprises subjecting the same to the action of a thiocyanate in solution.

**Process of Dyeing, and Apparatus Therefor**

(1,399,230; December 6, 1921)

BENJAMIN F. TOUCHSTONE, THOMAS E. GARDNER,  
JAMES A. BANGLE, DAVID M. SULLIVAN and JOHN  
ERNEST HARDIN

This is a method of treating warp which consists in reducing a complete set of yarn ends or threads to sheet form, conducting the sheet continuously through common yarn dyeing and treating means, and then in continuous pursuance to said treatment, winding the same directly upon a loom beam.

**Process of Precipitating Viscose**

(1,399,587; December 6, 1921)

FRANZ STEIMMIG

Describes a process for treating cellulose products for the manufacture of films and filaments, which consists in squirting the viscose into an acid-free concentrated solution of a neutral salt also containing only a small percentage of an ammonium salt.

**Machine for Unraveling Knitted Goods and Winding the Yarn**

(1,399,657; December 6, 1921)

MICHAEL F. ROBISCHON

Patent relates, in a machine for unraveling knitted goods having a plurality of feeds, to the combination of a thread-drawing unit for each feed of the knitted goods, each drawing unit comprising a movable thread-engaging member having at different parts thereof different drawing speeds, a thread guide movably mounted to direct the thread to differently speeded parts of the thread-engaging member, a movable arm engaged by the thread as it comes from the knitted goods and adapted to be moved by its thread in one direction when said thread becomes tight and to be moved by the thread in the other direction when the thread becomes loose, and means operatively connecting said thread guide and said arm whereby the guide is moved to the lower speeded part of the thread-engaging member when the thread is tight and to the higher speeded part when the thread is loose, and means for moving the thread-engaging members of the various drawing units at a given relative speed, a rack for holding the fabric to be unraveled and means for obtaining relative movement between said fabric rack

and the rest of the machine whereby the unraveling points on the fabric remain in operative position relative to their respective drawing units.

**Heating Wall for Coke Ovens and the Like**

(1,399,275; December 6, 1921)

ARTHUR ROBERTS (assignor to American Coke & Chemical Company, Chicago, Ill.)

Description is given of a coke oven heating wall comprising courses of blocks, the courses breaking joints with each other, each block having its four corners recessed to provide, in conjunction with the adjoining blocks a series of passages extending in zig-zag fashion between the blocks of the successive courses, and each block having in its lower central portion a downwardly projecting tongue entering into the space between the recesses of the two blocks immediately below it, whereby gases traveling lengthwise of the wall are compelled to pass around said tongues, and are therefore compelled to travel in zig-zag fashion, substantially as described.

**Take-Up Mechanism for Knitting Machines**

(1,399,121; December 6, 1921)

KENNETH HOWIE (assignor to Wildman Manufacturing Company, Norristown, Pa.)

Patentee describes, in combination in a take-up for knitting machines, a pair of take-up rolls, a movable support therefor, driving means for the take-up rolls, including a clutch, a connection from the movable take-up support for controlling the clutch and adjustable gravitating means for exerting pressure to vary the driving action of the clutch according to the demands of the work, said adjustable gravitating means including a weight, a pivotally mounted beam carrying the weight and exerting pressure upon the movable take-up support and through it upon the driving clutch, said beam extending in a plane substantially parallel with the take-up rolls.

**Yarn Severing and Clamping Device for Knitting Machines**

(1,400,180; December 13, 1921)

ALBERT M. PIGEON (assignor to Wildman Manufacturing Company, Norristown, Pa.)

Patentee describes a yarn severing mechanism for knitting machines, including in combination a needle cylinder, needles carried thereby, yarn guides, a relatively fixed shearing blade, a movable shearing blade, a spring for actuating said last-named blade for its shearing action, an oscillatory cam, and devices co-operating with said cam to shift and set said movable shearing blade against the tension of the spring, to hold said blade in its set position, and to trip said blade, all during movement of said oscillatory cam one way.

TEXTILES

PAPER

LEATHER

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

JANUARY 16, 1922

NUMBER 2

## FEATURES OF THIS ISSUE

D. R. Weedon, in "Practical Science of Kier Boiling," gives a survey of results obtained during twenty-five years of progress in the simplification of this operation, and presents data from tests.

"Two-Color Effects on Silk and Cotton," by E. W. Pierce, discusses the old Cassella process as a solution of the problem offered by hosiery dyeing to-day.

Proceedings of the American Association of Textile Chemists and Colorists include the inaugural meeting of the Rhode Island Section and an abstract of Roscoe L. Chase's paper on "Mercerization" presented at this meeting.

First complete English translation of Japan's dyestuff regulation legislation.

List of dyes licensed for December import by U. S. Treasury Department.

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the Practical Application of Dyestuffs and the Mechanical Equipment Incidental Thereto

Vol. X

NEW YORK, JANUARY 16, 1922

Number 2

## Practical Science of Kier Boiling

A Brief Survey of the Results Obtained by Twenty-five Years of Research and Experimentation to Simplify the Operation of Kier Boiling, Reduce Fuel Costs and Produce a Uniformly High Standard of Work

By D. R. WEEDON

*Jefferson-Weedon, Boston, Mass.*

IT is the intention of this article so to deal with the advance in the art of kier boiling that those who are charged with the responsibility for the operation may know of the intensive research work which has been done to assist them. Questions of quality and costs, both in investment and in operating, must receive careful attention, so that the best of fabrics may be marketed at the right price.

Those upon whom is placed the responsibility for the operation of kiers realize that cotton yarns or fabrics must leave the kier room in the proper condition. No amount of subsequent treatment can make up for the fact that goods did not start right. The objective which must always be kept in mind has three main heads; each head is very important:

1. Quality of work performed by kier.
2. Cost of producing high-quality work.
3. Uniformity of both quality and cost.

The quality of work done must be kept as high as possible, and this head is the one of prime importance. A discussion with almost any old bleacher who has had years of experience will bring out the opinion that the quality of work done by the original style center vomit kiers cannot be bettered; and, indeed, these old bleachers are almost correct. The quality was there, and uniformity was there (depending upon the human element); but economy, the magic word to-day, was absent. As a matter of fact, the records show a 5-ton kier of the center vomit type which consumes over 2 tons of coal for a single boil. Few could afford this to-day.

### RESULTS PRODUCED BY CENTER VOMIT KIER

That type of circulation, however, gave an almost ideal

kier condition. The liquor would percolate through the goods and gather in the space below the grates until the steam generated pressure enough to vomit a fairly definite amount of liquor through a pipe in the center of the kier over the top of the goods. This operation would be repeated approximately forty to forty-eight times per hour with reasonable regularity, provided steam pressure remained constant. Steam would blow to atmosphere during the period between one throw, or vomit, and the time when the percolating liquor resealed the bottom opening to the center pipe.

This intermittent throw of liquor allowed an even penetration of each and every fiber in the kier, and, in fact, practically forced a penetration, due to the inherent action of the kier; that is, emptying the space below the grates and throwing that volume of liquor on top of the goods. During the periods of rest the liquor would start an even passage, and the tendency to channel—that is, for liquor to find an easy passage through the goods—was decreased.

Extensive and careful study of the proper boiling of kiers involving many experiments and trials, and at the cost of much money, has extended over a period of more than twenty-five years.

### INCREASING DEMANDS OF PROGRESS

Circulation control by means of the liquor in a container operating a valve when a certain amount of liquor had entered was tried, injectors were tried, pumps and other devices were tried; but all were found to be below the plane of the desired requirements. As years passed, another element had to be considered; namely, duration of boil. No longer could unlimited hours be allowed for



an operation. The problem had also been further complicated by the size and variety of kiers, and the variety of goods to be boiled. Kiers now range from little ones holding less than a ton to large ones which may be 10 feet in diameter and 10 feet or more in depth, and holding as much as 5 to 5½ tons of dry goods. These kiers may be either of metal or wood, and open or closed. The open kiers are operated at approximately 190 deg. Fahr., while certain pressure kiers are operated at 30 pounds pressure, which is equivalent to 275 deg. Fahr. The types of goods boiled to-day now cover a much wider range. Raw stock, gauze for absorbent cotton and bandages, organdies with 200,000 yards in a kier, up through knit goods, threads, dress goods, sheetings and coutils, must all be boiled.

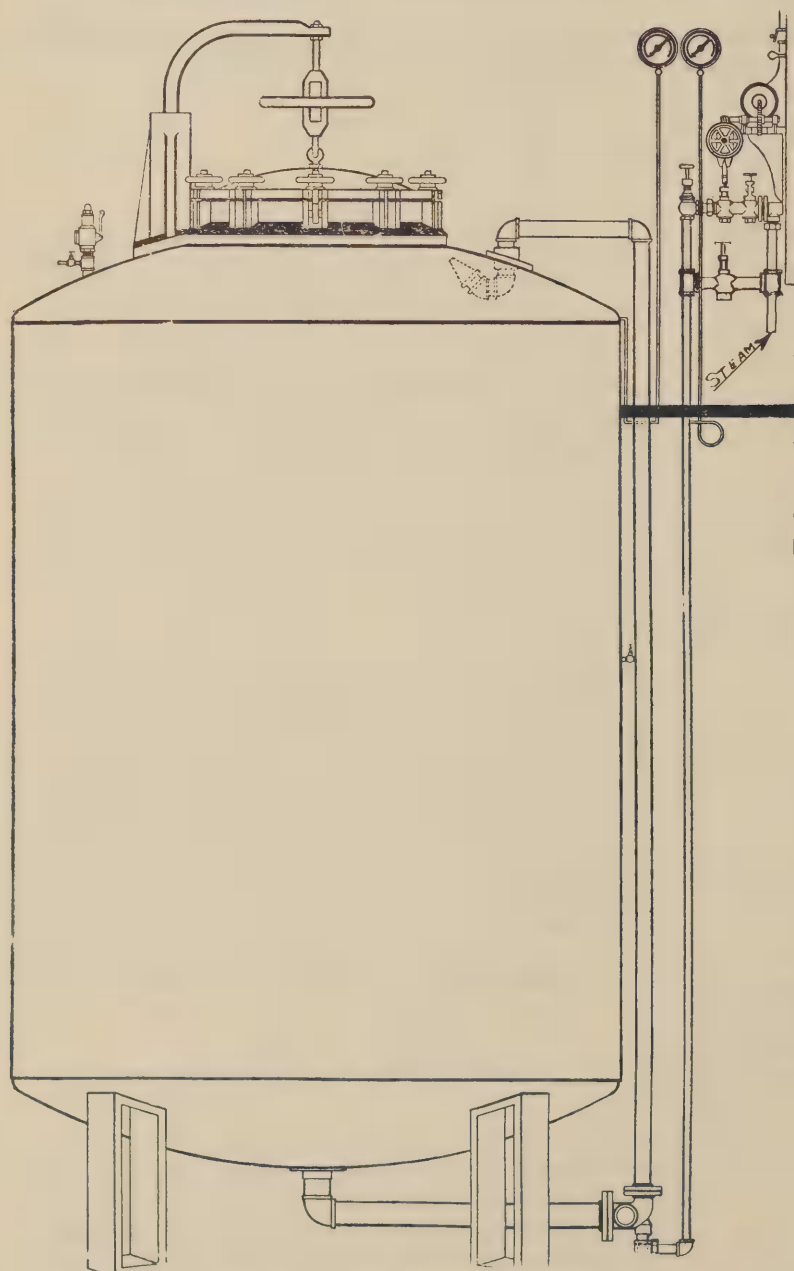
Then, too, a few years ago only the best cotton fiber was considered worth spinning and weaving; mutton tallow and potato starch were used almost exclusively for sizing, and kier chemicals were carefully selected. This, therefore, insured perfect saponification and removal of all substances, except cellulose. To-day, low-grade cotton, and even waste products, is spun and woven. Almost invariably mineral oil sizes have been substituted and mineral oils, cornstarch and cottonseed oil heated in a kier with caustic form apparatusine similar to paraffine. This combination, instead of being soluble, tends to form a coating on the surface of the cotton fiber, thus retarding the circulation during the early part of the boil. All these problems have been solved, and with proper equipment are being overcome. Constant study and research, with the gradual elimination of complications and the cutting out of undesirable extra equipment, has finally developed a remarkably simple system of kier boiling, which has had an extremely favorable influence on the three objectives heretofore mentioned.

#### HUMAN FACTOR REPLACED BY MECHANISM

By making the apparatus simple, the time and effort of kier attendants have been saved and maintenance costs decreased. The human element in kier boiling has been removed and replaced by a mechanism which will absolutely limit and control the quantity of steam used and give proper circulation. In fact, so uniformly does this mechanism operate that on a series of tests the results were practically identical. The figures only varied 170 pounds of total steam used, which is closer than could have been expected a few years ago.

The method of plating the goods into the kier and the nature of chemicals used necessarily vary with the individual opinions of different bleachers. The plating is usually done by hand, although mechanical platers or pilers are coming into use. A double boil with lime and soda ash, and in many instances with a straight caustic solution, produced proper results until minerals were introduced into the kier. Presteeeping of gray goods is of great value, often eliminating a second boil.

During the years of study it was constantly realized that the most desirable and efficient way of heating a kier would be to utilize the total number of heat units of the steam in the kier itself. It was also realized that grave danger appeared if rejected steam or condensate from any system of convection heating were returned to boilers



*Diagram of Positively Timed Vomiting Kier Described in Accompanying Article*

after becoming contaminated with caustic liquor. Leaks are liable to occur, often not easy to locate and repair. Then, too, the cost of the equipment necessary to collect and return these rejected heat units, together with loss of actual units which results through radiation, when transmitted long distances, means extra fuel cost per boil. Using the rejected heat units to preheat the liquor with which other kiers are to be charged is a good thing, but most kier boiling is done at night, the kiers having been charged during the preceding afternoon. Only a small part of the total rejected B.t.u., therefore, can be safely and advantageously utilized.

#### FUNDAMENTALS OF KIER PROBLEM

All of these features led to a scientific and entirely logical conclusion, namely: that the whole problem was one of charging the kier with the proper weight of caustic or other chemicals in solution with a predetermined quantity of water, and then admitting steam directly into the kier, thus putting into the kier every B.t.u. contained in the steam. This, of course, gradually dilutes the liquor; but as finally worked out from an engineering standpoint, the condition of the liquor throughout the entire boil is correct for any particular period. That is, strong solution when goods contain most impurities, the caustic attacking foreign matter first and gradually growing weaker as boil progresses. Of course, it is realized that the saponification of the foreign matter in the goods reduces the activity of the liquor, thus aiding in the maintenance of a scientifically exact balance.

After the kier has been brought to the desired temperature or pressure, as the case may be, the regulation of the remainder of the boil should be left to some mechanism to perform so that a positively timed intermittent vomit or throw will be produced similar to that of the old-style center vomit kier. This can now be accomplished and the steam consumption, during such automatic operation, held to a figure corresponding to the radiation loss for the average condition. By starting the boil with a strong chemical solution and low liquor line in the kier, this precludes the necessity for heating a large quantity of water through perhaps 200 deg. Fahr. The water added by condensation in this method of boiling does not have to be heated in the kier, since it enters as steam at possibly 300 deg. Fahr., sensible heat. By scientifically working out the proportions for any given kier it is unnecessary to allow any liquor whatever to overflow or be vented. In a properly operated kier the liquor line will be gradually raised so that the kier is never entirely filled. The only vented loss, therefore, is the small one, necessary when air is being eliminated early in the operation.

Inasmuch as this positive-timed vomiting control can be installed on either lagged or unlagged kiers, and since the action is entirely governed by an unvarying mechanism, it can be seen that uniformity has been secured. The quality is assured by the fact that the center vomit action is reproduced, except that the pipe in center of

kier has been removed, allowing more space for goods, and is connected from bottom to top, but on the outside.

#### RESULTS OBTAINED IN ACTUAL PRACTICE

That economical operation has been attained is shown by repeated tests and records of comparative monthly fuel costs verifying the following results. The figures below are based on cold charges of liquor, and the steam consumption is from start to finish of boil:

5-ton kier. . . . .	6,500 to 7,000 pounds steam
4-ton kier. . . . .	5,800 to 6,300 pounds steam
3-ton kier. . . . .	5,000 to 5,500 pounds steam

These results are being obtained in actual practice and without the necessity for elaborate equipment requiring constant attention both for repairs and during operation. One set of steam consumption figures from a series of tests conducted by a prominent firm of consulting engineers is given below, and shows what should be expected from two types of kiers. A heat balance worked out for each equipment checked remarkably close to actual steam required in each case. There is a time difference, as kier B did not require as much time as kier A in order to properly boil the goods. There is also a radiation rate difference due to kier A being almost surrounded by other operating kiers, while kier B was exposed to drafts on a cold night. This loss for kier A has been taken as 0.3 pound of steam per square foot of radiation surface per hour, and for kier B 0.45 pounds. In figuring the heating of the kier itself and the wet goods, proper specific heat factors have been used. It should be noted that for kier A the steam was shut off at the proper period before boiling was finished, the actual heat in the goods holding sufficient temperature, while circulation was continued, until the end of the boil. The actual steam used in each case is given below:

#### *Kier A, Pump and Heater*

Actual steam used . . . . .	9,074 pounds
Length of boil. . . . .	10 hours
Radiation surface—(Note: Rate of loss on Jefferson-Weedon kier higher than pump and heater kier, account of exposed location and air currents) . . . . .	675 sq. ft.
Weight of kier . . . . .	9,600 pounds
Weight of dry cloth . . . . .	11,100 "
Weight of moisture in cloth. . . . .	11,100 "
Weight of liquor in kier. . . . .	20,860 "
Total weight steam (liquor) vented, estimated . . . . .	100 "
Weight steam to pump (equivalent to 7.8 kw. electricity) . . . . .	200 "
B.t.u. in line, steam above 68 deg. Fahr. room temperature . . . . .	1,116 B.t.u.
Temperature kier before boil. . . . .	68 degrees
Temperature wet cloth before boil. . . . .	68 "
Temperature liquor before boil . . . . .	40 "
High temperature during boil. . . . .	250 "



*Kier B, Jefferson-Weedon*

Actual steam used.....	6,775 pounds
Length of boil.....	7 hours
Radiation surface—(Note: Rate of loss on Jefferson-Weedon kier higher than pump and heater kier, account of exposed location and air currents).....	625 sq. ft.
Weight of kier .....	9,600 pounds
Weight of dry cloth .....	11,100 "
Weight of moisture in cloth.....	11,100 "
Weight of liquor in kier.....	11,070 "
Total weight steam (liquor) vented, estimated .....	100 "
Weight steam to pump (equivalent to 7.5 kw. electricity) .....	...
B.t.u. in line, steam above 68 deg. Fahr. room temperature .....	1,116 B.t.u.
Temperature kier before boil.....	68 degrees
Temperature wet cloth before boil.....	68 "
Temperature liquor before boil .....	40 "
High temperature during boil .....	240 "

*Kier A*

B.t.u.

Radiation loss = $675 \times 0.3 \text{ lb.} \times 10 \times 1185$ ...	2,391,600
Heating kier = $9600 \times (250-68) \times 0.117$ ....	204,400

H'ting wet cloth = $22200 \times (250-68) \times 0.69$ ...	2,787,000
Heating liquor = $20860 \times (250-40)$ .....	4,380,600
Vented = $100 \times 1152$ .....	115,200
Circulation = $200 \times 1116$ .....	223,200
	<hr/> 10,110 923

*Kier B*

B.t.u.

Radiation loss = $625 \times 0.45 \text{ lb.} \times 7 \times 1185$ ...	2,332,968
Heating kier = $9600 \times (240-68) \times 0.117$ ....	193,290
H'ting wet cloth = $22200 \times (240-68) \times 0.69$ ...	2,634,696
Heating liquor = $11070 \times (240-40)$ .....	2,214,000
Vented = $100 \times 1152$ .....	115,200
Circulation = (0) .....	.....

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7,490,154

Divide total B.t.u. by 1116 gives steam: Kier A, 9,059 pounds; actual, 9,074 pounds; unaccounted for, 15 pounds. Kier B, 6,711 pounds; actual, 6,775 pounds; unaccounted for, 64 pounds.

The simplicity of the equipment which will give the results described is shown by the cut accompanying this article.

## Two-Color Effects on Silk and Cotton

Various Processes and Their Disadvantages—Old Casseila Process Offers Solution to Present Hosiery Problem—Goods Should Be Boiled Out First—Effects Obtainable by This Process

By E. W. PIERCE

THERE are a great many dyestuffs which will dye silk from an acid bath leaving cotton unstained, in fact, the majority of acid dyes have this property, and when the nature of the goods permits, the silk may be dyed in this way and the cotton dyed later in a cold bath. Unfortunately, the number of cotton dyes that will dye cold and not stain the silk, especially when the silk is in an acid condition, is so limited that this method is hardly ever used. Some acid dyes will color silk from a neutral bath, slightly tinting the cotton, and there are a few cotton dyes that will dye cotton only at a full boil. The best condition for leaving the silk clean is to have the bath slightly alkaline, but this hinders the acid dye and makes the cotton stain more. This is known as shot dyeing but it is easy to see how uncertain the dyer must be of getting the same results twice in succession. Both this and the first method also have the disadvantage that washing, or even water spots, are likely to cause the colors to run together.

Other dyers prefer first to dye the cotton in an alkaline bath and later to tint the silk, sometimes with neutral dyeing acid colors or even basic dyes. Probably most of the two-color dress goods are dyed in

this way but up to this point the results are not entirely satisfactory.

Besides dress goods we now find knit fabrics of silk and mercerized cotton or viscose silk and such goods, especially hosiery, are expected to stand washing reasonably well.

### DIAZO BLACK BH

The first attempts along this line were with Diazo Black BH, which dyes cotton from a cold alkaline bath and leaves silk white. The direct dyeing was very good but when it was diazotized and developed, whether with metatoluylene diamine or beta-naphthol, the silk was old gold or brownish in tint. This is because silk itself diazotizes and then couples with the developers to produce new dyes. Some still use this method, despite the dull color of the silk, but we are limited to navy and black cotton with dull tones cross-dyed on the silk.

### THE OLD CASSELLA PROCESS

Many years ago the Cassella Color Company pat-

ented a process of dyeing sulphur dyes on cotton in the presence of silk without tinting or injuring the silk, and this process seems to offer the best solution to the problem for hosiery to-day.

The dyestuff is prepared in the usual way by dissolving in sodium sulphide, but much more concentrated baths are needed than when dyeing cotton alone. Glue—ordinary carpenter's chip glue—is soaked in cold water overnight, then heated in a water jacket till melted, and added at the rate of five pounds for 100 pounds of goods. The further addition of 5 per cent of sodium phosphate is advocated by some dyers. The dye bath is kept at not over 120 deg. Fahr., better around 100 deg. Fahr., and the amount of salt is naturally less on account of the lower temperature.

The goods should be boiled out first. Some dyers advocate leaving the gum on the silk as a protection. It is removed anyhow by the sulphide bath, but a series of tests showed that boiled-off silk was really left cleaner than silk in the gum.

#### EFFECTS OBTAINABLE

Dye for an hour at the low temperature specified and then rinse thoroughly in cold water. Shades of sulphur black (some dye cleaner than others) from full tones to pale grays, blue from light sky blues to deep navies, brilliant greens, dull greens, yellows,

orange, tan, brown, Bordeaux, olive and many other tones may be dyed in this way on the cotton, leaving the silk clean and white.

When the cotton is dyed it is fast to washing to a high degree and is also fast to cross dyeing and rather good toward light. The silk may be dyed with any acid dye that does not tint cotton and if the cotton is a deep shade or a black, direct dyes may be dyed in light shades so the silk will be faster to washing than it dyed with acid colors.

#### APPARATUS SHOULD BE ADJUSTED TO MEET CONDITIONS

This method is entirely practical and if the proper sulphur colors are selected the results will be very satisfactory.

The conditions need a little adjusting to the apparatus employed. If the cotton dyes too quickly and the color is only superficial it is likely to rub, but if the dye bath is right, the dyeings will be perfect. In fact, most of the bright sulphur colors give richer tones at 120 deg. than at a boil; this is especially true of the Bordeaux and red browns.

Practically all of the necessary dyes are now available in this country and, if goods dyed in this way are put on the market, the consumer will have an easy means of showing his or her approval.

## Things Every Textile Chemist and Colorist Should Know

*[Note—Under this heading will be introduced as a more or less regular feature the discussion of certain fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.]*

### The Fundamental Difference Between Vegetable and Animal Fibers

**T**HE vegetable and animal fibers are frequently found to act entirely differently when subjected to exactly the same treatments.

For instance, if a skein of cotton is boiled in a 3 per cent solution of caustic soda for five minutes, there is no appreciable action upon the cotton other than to cleanse it, but a skein of wool boiled the same length of time in the same reagent entirely disappears.

Boil a similar skein of cotton in a 3 per cent solution of potassium bichromate for one hour and no appreciable change takes place, but if a skein of wool is boiled the same length of time in the same reagent it will be found that a slow decomposition of the potas-

sium bichromate has taken place and a varying quantity of an oxide of chromium has been deposited upon and within the wool fiber.

Again, put a similar skein of cotton and wool into a boiling solution of an ordinary acid dye and it will be found that the wool will gradually absorb practically all of the dye, and the cotton, none.

From these few, of the many possible illustrations, it is evident that there is some fundamental difference between vegetable and animal fibers.

A comparative study of the chemical composition of the two furnishes the explanation.

Cotton, like most of the vegetable fibers, is composed fundamentally of cellulose, which is classed chemically as a carbohydrate. The carbohydrates are composed of carbon and oxygen and hydrogen in the right proportion to form water, but contain *no nitrogen whatever*. Cellulose is rather inert chemically and displays no pronounced acid or basic reaction.

The animal fibers, on the other hand, are highly nitrogenous, i. e., nitrogen is one of their essential constituents, and they all contain as much as 17 to 19 per cent of the element nitrogen in addition to carbon, oxygen and hydrogen. Furthermore, the animal fibers



contain a particular type of substances chemically known as amino-acids, which correspond to the following general formula:



In the above formula it will be noted that in addition to the R which represents a more or less complicated hydrocarbon radical, there is the  $\text{-NH}_2$ , or amino group, and the  $\text{-COOH}$ , or carboxyl group. The amino group is, practically speaking, an ammonia residue and consequently has a tendency to impart decidedly basic properties to the animal fibers.

The carboxyl group, on the other hand, is the characterizing group of practically all organic acids and its presence has a tendency to impart decidedly acid properties to these fibers. Owing to the simultaneous presence of the two, however, the action of one to a certain extent counteracts action of the other.

Depending upon conditions, the basic action of the amino group will predominate in some cases and the acid reaction of the carboxyl group in others. It is therefore easy to see why wool and the other animal fibers are more reactive than the vegetable fibers. The greater affinity of the animal fibers for both mordants and dyes is also explained by this pronounced difference in chemical composition.

## The Dyeing of Acetyl Silk

Read Before the West Riding Section, Society of Dyers and Colourists, and Presented in the "Journal" of the Society, December, 1921

By J. F. BRIGGS

THE history of artificial silk dates from the eighties of the last century, when Chardonnet introduced a fiber of collodion extruded from glass spinnerets. This silk, consisting of an ester of cellulose, had many remarkable qualities, but it possessed the grave drawback of violent inflammability, which caused the ester silk soon to give way to a cellulose silk derived from it by special methods of saponification.

After a most successful vogue the modified Chardonnet silk was forced to face a most powerful competitor in the form of viscose silk, also a hydrated cellulose fiber, which now takes the first place in volume of production. The popularity and utility of these artificial fibers have spread to world-wide dimensions, and their sphere of application has long outgrown the narrow limits of silk substitutes. They are now employed not only by themselves, but also in conjunction with cotton and wool in almost every branch of the textile industry.

As these silks emerged into the more open competitive markets, the demands made upon them for quality became more and more stringent. They were no longer used merely for ephemeral display or fashion purposes, but had to justify their existence in every-day wear. Thus, for instance, the demand arose for dyeings with the faster dyestuffs, and they were expected to survive a good many visits to the laundry. In other words, the whole range of applications was widened, and shifted in the direction of severe utility.

All this was to the good, and a vast new industry was created by twenty years of the most arduous and highly organized scientific work, in which Great Britain can justly claim the credit of the largest share. Nevertheless, there remained one or two gaps which the artificial

fibers of hydrated cellulose failed to fill completely, notably their relative lack of resistance to rough treatment in the wet condition, and an absence of "liveliness" and "fullness" in the hang and handle of the finished goods. The tradition of the old original nitro-ester silk still lingered, and at various times during the last decade attention has been turned to the production of an ester silk of low hydration, which should be free from the dangerous inflammable properties of the collodion silk, while possessing its most desirable attractions.

This serves to introduce acetyl silk, the new ester-silk, as the direct outcome of the cellulose acetate industry, which came into existence for the purposes of the war. The new silk is now first entering the market as a commercial product, after having successfully overcome a series of technical problems on the manufacturing and textile side, entailing a vast amount of systematic research work. This in itself was no mean achievement, taking into account the comparatively short time available, and the unsettled industrial position of the country; it does not, however, form the subject under discussion in the present paper. Given the new product, the dyer has principally to consider the chemical and physical properties of the fiber substance itself, particularly in the points where these differ from the affinities of the hydrated cellulose silks with which he is already familiar.

Any dyer of twenty or thirty years' standing can no doubt recall difficult times in handling the older artificial silks, and even at the present day, dyeing troubles with these fibers are by no means uncommon. Such troubles are partly inherent in the physical structure of the solid filament, and are partly due to the mixing up of silk of many different origins. The chemical differences so

encountered may even occur in silk from the same maker; they are attributable to the intense chemical and physical lability of the cellulose molecule under conditions of hydration which are not always under strict control.

The animal fibers, silk and wool, are chemically defined as amino-carboxyl colloid bodies of predominant basic functions; that is to say, they exert their principal activities in their relations to acids. The cellulose fibers, such as cotton and its derived modifications, have been described by competent authorities as hydroxylated colloids of approximately neutral functions. Their affinities are determined by hydroxyl groups with acidic and basic functions fairly evenly balanced, though with a slight inclination towards the acid side. The introduction of acetyl groups into the cellulose molecule has two effects: the suppression of most of the hydroxyl groups, so that the product is no longer mainly a hydroxylated colloid, and a redistribution of the balance between acidic and basic functions, so that the acidic definitely predominate. The control of these two chemical factors defines the problem presented to the dyer in dealing with cellulose acetate silk.

After removal of traces of residual solvents, and reconditioning in the ordinary English climate (70-80 per cent relative humidity), the silk contains about 5 per cent of natural moisture, which may range between 3 per cent and 7 per cent under extreme atmospheric variations. It thus corresponds approximately with bleached cotton in its hygrometric relationships. Its relations to liquid water, however, are very different. Owing to the residual hydroxyl groups, which are present in small proportions, cellulose acetate silk is not absolutely indifferent or impervious to water. That would be undesirable from the dyer's point of view. The amount of water absorbed by the solid fiber when it is in equilibrium with the surrounding liquid is, however, far smaller than with other artificial fibers, and it is this relative resistance in the presence of water, which gives to acetyl silk its remarkable property of withstanding frequent and severe laundry operations. The quantity of water absorbed by the fully saturated fiber as it comes out of the dye bath has been estimated, after whizzing in the centrifuge, at 35 per cent of the dry weight, as compared with viscose under the same conditions giving 90 per cent. This quality of insensibility towards water is a most valuable asset of the new silk, imparting far-reaching advantages to the fabric when used as wearing apparel or undergarments. The silk, for instance, is a non-conductor, not only of electricity, but also of heat, and the problem of warmth versus weight is thus solved. Perspiration does not wet it, and evaporation from wet outer-garments does not chill the body.

A number of new and intensely interesting theoretical speculations are opened up by a study of the dyeing affinities of the new ester silk for the various main groups of dyestuffs. Without going deeply into these theoretical considerations, it is interesting to note that with few exceptions the affinity shown for the group of substantive cotton dyestuffs by the untreated acetyl silk is only slight.

Thus the silk is not "stained" by the "bleeding" of other fabrics in contact with it.

Nevertheless, all these dyestuffs can be utilized, if desired, by a simple chemical treatment, either before or during dyeing. This treatment consists of a partial restoration of the hydroxyl groups by a limited saponification with caustic or other alkali as described below. On the other hand, most interesting and valuable results are obtained by taking advantage of the chemical constitution of the silk as an ester, and selecting classes of dyestuffs containing constituent groups which are in sympathy with the ester, and which dye it without any chemical modification whatever. Towards aromatic bases and basic dyestuffs the ester silk presents a definite and very pronounced absorption and fixation capacity, which appears to be attributable to the entrance of acetic acid into the cellulose molecule, and the consequent shifting of the balance of affinities towards the acid side. Further, certain chemical groups which may be regarded as sympathetic towards the cellulose ester, are at the same time members of typical ranges of dyestuffs, and also characteristic of common solvents of cellulose acetate. Dyestuffs containing these specific groups have a direct dyeing affinity for the unmodified ester silk, provided such groups are predominant.

Practical methods of dyeing acetyl silk may therefore be classified broadly under two distinct headings:

1. The *saponification method*, in which the constitution of the silk is chemically modified from the surface inwards, in such a manner as to regenerate a portion of the cellulose, which can then be dyed by the same methods, and with the same dyestuffs as the older artificial silks.

2. The *direct method*, in which advantage is taken of the properties of the silk as a cellulose ester, and dyeing is carried out with selected dyestuffs without any modification of its chemical composition.

1. *Dyeing by the Saponification Process.*—The alkaline saponification process for the dyeing of acetyl silk was first suggested some ten years ago, when it was stated that the dyeing affinities were thereby greatly modified.

This reaction has been closely studied in order to find the most favorable conditions for its application on an industrial scale. It is based, of course, on the removal of acetyl groups from the ester, and if this removal were carried to completion, the product would be a cellulose silk comparable with the ordinary denitrated Chardonnet silk. Such a complete de-acetylation is, however, not necessary in order to produce a suitable dyeing affinity for substantive dyestuffs, and since the ester quality of the silk should be preserved as its most valuable characteristic, a complete conversion into cellulose is not generally desirable. The first problem was therefore to control a partial saponification in such a manner that the proportion of acetyl groups removed should be just that which is desired. This object is easily obtained by using a definite weight of caustic soda, calculated on the weight of the silk, and causing it to react to complete exhaustion. The control thus becomes quite automatic; the acetyl groups removed are equivalent to the caustic soda en-



ployed, and no further action can take place after this quantity is neutralized.

A partial saponification can take place in two ways, either the caustic soda can penetrate and then saponify—the result would then be a general and uniform lowering of the acetyl value of the total ester; or it can saponify immediately it comes in contact with the surface of the fiber, and before it has time to penetrate to the interior. In this case, the result would be a superficial coating of pure cellulose, graduating up to unmodified cellulose acetate towards the interior. It would appear that the highest efficiency is to be expected by the latter method, since for any given consumption of soda it represents the maximum formation of cellulose, and the minimum alteration of the original ester.

A method of analysis has been worked out for the study of the composition of any given product of partial saponification. The proportion of completely unmodified cellulose ester is determined by repeated extraction of the silk with dry boiling acetone, until no more soluble matter can be extracted. The insoluble residue is weighed and consists of pure cellulose, together with cellulose acetate so modified by partial saponification that it is no longer soluble in acetone. The cellulose may be determined in this residue, or in a fresh portion of the original sample, by extracting it three times in succession with ten times its weight of active cuprammonium solvent, the time of contact being not more than two minutes for each extraction. The extract is immediately acidified, and the precipitate collected, washed, dried and weighed. The insoluble residue may also be weighed as a control. This treatment is sufficient to dissolve all the pure cellulose, together with only a small quantity of the lowest acetate of cellulose, the major bulk of the modified ester and the whole of the unmodified cellulose acetate being unattacked by the cuprammonium in the short time allowed for the extraction.

A typical example of silk saponified in a 50 to 1 bath with 10 per cent of caustic soda at 75 deg. Cent. showed by this scheme of analysis:

Cellulose, soluble in cuprammonium .....	23% (outer layer)
Unmodified cellulose acetate, soluble in acetone .....	67% (interior core).
Modified layer, insoluble in acetone and cuprammonium .....	10% (intermediate layer)

The above considerations lead one to adopt for practical use conditions which favor a high intensity of the initial reaction, whether by working at high temperatures with dilute solutions of caustic alkali, or with high concentrations at lower temperatures. The action then proceeds evenly from the surface to the interior, and the degree of dyeing affinity produced is proportional to the amount of caustic soda consumed.

The process may be carried out in two ways, either by the single bath method, in which dyestuff and alkali are

allowed to work together simultaneously, and the dyestuff is absorbed as the saponification proceeds; or else by the pre-treatment method, in which the saponification is conducted as a separate process, and the saponified silk is afterwards dyed in the ordinary way just like the older varieties of artificial silk. Good results are obtained by either method of working—some dyers prefer the one, and some the other; others adopt one or the other method according to the nature of the work.

On this principle any of the basic, substantive, sulphur and vat dyestuffs can be easily dyed to full shades.

2. *Dyeing in Virtue of Ester Affinities without Chemical Modification of the Silk.*—It is necessary to correct an impression based on statements which have appeared in text books, and in the technical journals, to the effect that cellulose acetate silk cannot be dyed directly without the use of swelling agents or other costly and difficult pre-treatments. Such statements may have had a foundation of truth when applied to the earlier types of acetyl silk produced more or less on an experimental scale in foreign countries some five to ten years ago. Historically, the method of dyeing with the assistance of swelling agents is the oldest, but commercially these methods have, at the moment, no general importance. A swelling agent, however, is merely a suppressed solvent of the ester, and progress in the way of "mordanting" along these lines is by no means to be excluded. At the present time, and with the silk manufactured at Spondon by the Dreyfus process, no swelling agents are required, and we have the authority of one of the foremost dyers in this country for the assertion that the silk can be dyed without any modification or pre-treatment, to any desired shade and degree of fastness just as easily and just as cheaply as any of the older artificial silks on the market.

Only it stands to reason that the dyestuffs most usefully employed are not always the same. Just as wool and cotton have each their particularly suitable classes of dyestuffs, as well as many in common, so acetyl silk and viscose silk show special differences in affinities as well as certain similarities. Already the more enterprising manufacturers of dyestuffs are realizing this fact, and are preparing special lists and pattern cards representing "Cellulose Acetate Dyes'tuffs," recommended for dyeing this silk without chemical modification.

This method of dyeing the untreated silk by selected dyestuffs having a sympathetic affinity for the cellulose ester has been closely studied by Dr. R. Clavel, representing one of the most important dyeing and finishing companies in Switzerland, Messrs. Clavel & Lindenmayer, of Basle.

The basis of selection is by chemical constituent groups favorable to the absorption and fixation of the dyestuffs, such as amino and alkyl-amino groups, hydroxyl, nitro and ketonic groups. Sulphonic acid groups have a definitely unfavorable influence, which increases with the number of sulpho groups present, but which in certain cases is counteracted in a favorable sense by the other groups in the molecule.

Clavel adopted the method of dyeing basic dyestuffs

in the presence of magnesium chloride, which increases the efficiency of the bath. He also recommended the addition of small quantities of aniline hydrochloride to the dye bath when dyeing the simple mono-azo acid colors. In selecting the azo dyestuffs, preference is given to those which contain no sulphonie acid groups, and yet are soluble to some slight extent in water. Examples of this type are Terra Cotta and Azochromine (Geigy), and their equivalents by other makers. The Metachrome colors of Brotherton also contain several useful members.

Very important discoveries made by Clavel relate to the direct dyeing of the Gallocyanin and Alizarin dyestuffs without mordants. Dyestuffs of the Gallocyanin type have an affinity for the ester, both in virtue of the basic function of their alkylamine groups and the phenolic function of their gallic acid groups. These dyestuffs yield shades of violet, blue and gray, many of which are extremely fast to light and washing. Violet PDH (Durand & Huguenin) deserves particular mention because its direct affinity for the ester silk is very high, and the qualities of the dyeings are extremely satisfactory.

The Alizarin dyestuffs dye directly without a mordant in virtue of their phenolic and ketonic functions, but the shades obtained on unmordanted silk are not always the same as those usually associated with the alizarins when dyed on mordants.

By a suitable selection of dyestuffs from the basic, acid, gallocyanin and alizarin groups, it is possible to devise a range of simple and compound shades which cover the scale practically completely, and with care in the selection of the dyestuffs, all the commercial demands for fastness for different purposes can be easily satisfied. Moreover, the range of available dyestuffs is being constantly enlarged. For instance, the principle and the details for developing fast azo colors on the fiber by the diazo method have been worked out, the application of Aniline Black and other oxidation dyestuffs to acetyl silk has been investigated and brought to a commercial issue, and the successful dyeing of the vat colors without the necessity of modifying the constitution of the ester by saponification, as formerly, is now reported.

In Switzerland, where the extraordinary qualities of the finer counts of acetyl silk are very highly appreciated, especially by the ribbon weavers, the experts are most enthusiastic in their reports, stating that in appearance, elasticity and handle, this silk is nearer the real silk than any artificial silk yet produced. Messrs. Clavel & Fiedenmeyer are actually dyeing large quantities of these fine counts, on behalf of the Swiss weavers, for the Paris trade.

At the same time acknowledgments must be made of the important work contributed by British firms of dyers, such as Messrs. Burgess, Ledward & Co., Manchester, Messrs. Samuel Heap & Co., Rochdale, Messrs. Hicking & Co., Messrs. Thos. Adams & Co., Messrs. Hicking and Pentecost, and Messrs. Dobson & Co., of Nottingham, and by the chemists of the British Dyestuffs Corporation, Ltd. in the development of these processes on a commercial

scale. Messrs. Horsfall & Sanderson, of the latter Company, have communicated a method of dyeing insoluble dyestuffs such as Induline, Nigrosine, Rosaniline, and other bases from a fine suspension of the dyestuff by pouring its alcoholic solution into a large volume of water. They have also developed a method of "dry dyeing" from benzene, containing a small quantity of an alcoholic solution of the dyestuff.

*Applications.*—Before dyeing, it is very important to wet the silk out in a bath made up with soft water at 45 deg. Cent., containing about 2 per cent of hard soap, and 4 per cent of commercial ammonia solution (3.5 per cent  $\text{NH}_3$ ), calculated on the weight of the goods, in order to remove the grease and dirt from the surface of the fiber. The silk is worked for twenty minutes, and then rinsed in two changes of soft water. It is next soured in a bath containing  $2\frac{1}{2}$  per cent of hydrochloric acid (30 per cent HCl) on the weight of the goods, and finally rinsed.

*Basic Dyestuffs.*—All the basic dyestuffs can be dyed readily on acetyl silk without previous treatment. Tannin mordants are unnecessary since the affinity between the dyestuff base and the acetyl groups of the ester is sufficient to fix the dyestuff without assistance. The bath is generally set up with 1 or 2 per cent of acetic, and from 5 to 20 grams of magnesium chloride per liter of bath. In some cases common salt may replace a part or the whole of the magnesium salt.

In dyeing basic dyes, the temperature of the bath should be carried up to 65 deg. Cent. in two stages. At that temperature equilibrium is reached in about one hour. All basic dyeings should be finished out of acid water ("avivage") using acetic, formic, or tartaric acid. By mixing a little olive oil emulsion with this bath, a remarkable "scoop" finish may be obtained.

Many of the basic dyestuffs are extremely fugitive to light, and some of them, such as Auramine, Chrysoidine, Bismarck Brown, and Methylene Blue, while giving beautifully bright shades, have to be used with caution. On the other hand, certain of the basic dyestuffs are much faster to light on acetyl silk than they are on the older types of silk, or tannin-mordanted cotton. A very notable instance is Malachite Green; Magenta is also faster on this silk than on other fibers. Setocyanin and Setoglucin, blue dyestuffs allied to Malachite Green, also share the same property of remarkable fastness to light. Typical of a class of basic dyestuffs of the oxazine group, exceptionally fast to light, are Capri Blue and Cresyl Blue. Combinations of the above-mentioned dyestuffs cover the scale of bright blues, royals, saxes, mauves, and greens. Rhodamine S gives a bright pink of good fastness, and the Methyl Violets are useful on account of the full bright shades obtainable. All the basic dyestuffs are characterized by very easy leveling qualities, and further examples of this type are under investigation, the results of which will be communicated in due course.

*Gallocyanin Dyes.*—The dyeing of these is closely similar to that of the basic dyes; they are, in fact, basic oxazines, containing gallic groups. Violet PDH and Mod-



ern Violet (Durand), among others, may be cited as typical of the class. The dyestuffs are sensitive to metallic salts, and should not be dyed in copper baths. The dyestuff should be dissolved in cold water, and dyeing started in a cold bath, the temperature being gradually raised. The affinity of these dyestuffs for acetyl silk is so great that it is necessary to prevent them from rushing on too quickly. This high affinity also enables them to be used very economically, and Violet FDH is a main constituent of most dark colors, such as navy blue, black, and nigger brown. It is shaded by using in conjunction with Malachite Green for navy and Azochromin for black and brown. After dyeing, the goods should be soaped to remove all tendency to rubbing, and the ultimate shades should be developed and fixed by aftertreatment with bichromate and acetic acid. Celestine Blue B, Coreine RR, Gallamine Blue, and Gallo Sky Blue are also useful members of this series.

*Alizarine Dyes.*—The alizarines are generally dyed from a plain bath in soft water. The dyestuff feeds on in virtue of its chemical affinities, even though it is only very sparingly soluble in the water. Some of the dyeings change shade on treatment with soap, but the original color returns on acidification. Alizarin Orange AO (nitro alizarin) is a very useful member of this series, fast to light. It is used for shades ranging from salmon pink to old rose. Alizarin Garnet is not sensibly changed by soap, and is largely employed in the Clavel prescriptions. Alizarin Green S gives a very pleasing shade of gray, in the dyeing of which the temperature should be carried up to 75 deg. Cent. Alizarin Blue ABS gives a reddish-blue, fast to light.

*Azo Dyes.*—Certain of the sulphonated azo dyestuffs can be dyed directly on acetyl silk, chiefly yellows, oranges, and some of the reds, notably Roccelin. Azo Yellow I and Metanil Yellow are useful, and fast to light. Azo Yellow is frequently employed as a bottom for emerald and jade greens, topped with a basic green or blue. There are also a number of simple azo dyestuffs not containing sulphonic groups which dye the silk directly, and are fixed either with or without aftertreatment by chroming. To this series belong the so-called Alizarin Yellow 3G, and Alizarin Orange R, salicylic acid derivatives fast to light. Very frequently what is substantially the same dyestuff is sold under several different names, and it is difficult to mention all. There are a number of browns in this series which may be typified by Azochromin, but they are not all identical in constitution, since some are fast to light and some are not; most of them require development and fixing by afterchroming. Alliance Fast Brown 5G paste (British Dyes) may be mentioned here. Messrs. Brotherton's, the makers of the Metachrome dyes, have selected a number of dyestuffs suitable for acetyl silk, including an interesting fast-to-light bluish pink, called Rose Pink CA58. Messrs. Durand and Huguenin offer Chromocitronine, Chromoxanthine, and Chrome Deep Brown RR.

*Indigoid and Other Vat Dyes.*—Vat dyestuffs, including the Indigoid and those of the Algal and Indanthrene

class, which can be vatted without the use of large quantities of caustic soda, are suitable for dyeing unsaponified acetyl silk, saponification during dyeing being inhibited by the presence of an ammonium salt. Sulphur dyestuffs also, when reduced in the same manner as ordinary vat dyestuffs, should give useful results for fast shades. These methods are still under investigation, but fine shades of fast pinks and blues have been produced with Durindone Red Y, Ciba Blue, Indigo Blue paste, etc.

*Development Dyeing by the Azoic Process.*—The remarkable affinity of cellulose acetate for aromatic amines and phenols suggests a vast range of possibilities for developing azo dyestuffs by diazotizing on the fiber. This principle was suggested many years ago, but it has been taken up in detail and perfected in recent times and the field greatly extended. There seems, in fact, no limit to the possible combinations obtainable, and it only remains to sort out those items which are of the greatest practical utility and fastness.

The amines are dissolved in the form of their hydrochlorides, and the silk is treated with these solutions very much in the same manner as if dyeing with a basic dyestuff. If the amines themselves are colored, as for instance *m*-nitro-*p*-toluidine, aminoazobenzol, etc., the silk may actually be matched to a standard undeveloped shade, as when dyeing Primuline on ordinary cellulose. When the amines are colorless, it is necessary to work according to formulæ, and to make trial developments from time to time. The advantage of this method lies in the fact that the excess of dye bath may be washed off, and there is no danger of precipitating loose color on the surface of the fiber. Contrast this with the common method of dyeing cotton with Paranitraniline Red, where chemical affinities do not exist. The diazotizing of the prepared silk, and the coupling with alkali phenolates result in beautifully bright shades, perfectly fast to washing and rubbing.

*Aniline Black.*—The attractive affinity for aromatic amines makes this silk eminently suitable for dyeing by the Aniline Black method. This process has also been worked out, using a silk previously mordanted with aniline hydrochloride solution, and then impregnated with a strong aniline hydrochloride, chlorate and copper liquor. It is whizzed, hung up, and oxidized for 1 to 1½ hours at a temperature of 40 to 60 deg. Cent., aftertreated with acid bichromate and shaded up.

These considerations will suffice to show that the dyeing of acetyl silk is not more difficult than the dyeing of any other artificial fiber; it is only somewhat different. The differences, however, are no greater than those which divide cotton from wool. The dyer has only to get used to it, just as in the old days he had to get used to Charbonnet, viscose, etc. Plenty of dyestuffs are available, and plenty of methods, and both these are being increased all the time. Especially the azoic method offers attractive possibilities of future extension and gives dyeings of unexampled solidity and brilliancy. As the demand develops, dyestuff makers will bring forward new dyes specially designed for this silk. The silk itself, both in

handle and appearance, is manifestly superior to anything which has gone before. Difficulties in manufacture, in application and in dyeing, have been encountered and surpassed, and the new industry is now both technically and commercially established. Nothing can effectually obstruct its development, and there is a big future before it.

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## TREATING SILKS

**A**N English patent (161,625) taken out by E. L. Maupai, of New York, protects a process of treating silk, one of the objects being to dye single-thread or grege silk, containing natural gum, while in the hank or warp.

The dyeing of untwisted silk containing natural gum while in the hank or warp to produce a fast color is difficult, because the gum in the silk tends to dissolve, causing the hank to become a compact mass, which makes weaving or throwing almost impossible.

It has previously been proposed to treat raw silk with formaldehyde to convert the sericin into a permanent coating insoluble in hot liquids.

The present process consists in treating raw silk threads or grege to harden or render the gum or ceraceous matter of the silk insoluble in dyeing liquors, dyeing the silk thus treated, and, after weaving, removing the gum or ceraceous material from the silk fabric.

By hardening the gum the danger of the silk becoming a matted mass is avoided. The final step of removing the gum from the woven fabric gives it a superior luster.

Partial hardening of the gum in the silk is effected by subjecting the hank or warp to an acid bath, sulphuric or hydrochloric acid, diluted with warm water.

The silk is then treated with a solution of alum, or of chrome acetate, or of chrome chloride, or of nitrate of iron (or any iron liquor used in dyeing), all depending upon the color to be used for dyeing. The action of these fixing elements is still further to harden the gum, so as to produce an insulation around each thread protecting the hardened gum in or on the threads against the action of the alkali and acid present in the dyeing solution.

The threads thus treated will be pliable but firm, and can be worked for a considerable length of time in the dyeing solution without affecting the ceraceous matter or gum present in the silk.

The silk may be dyed in the usual manner. The dye employed, of course, must have an affinity for the particular mordant used.

As an example, the silk is first treated with a 10 per cent solution of sulphuric acid for about twenty minutes at about 150 deg. Fahr. It is then suspended to be hardened in a bath—for instance, a solution of

chrome chloride of a strength 10 deg. B., at about 150 deg. Fahr.—for one hour and dyeing is proceeded with in the usual way.

When the raw silk has been dried after dyeing it will be ready for weaving. After weaving the fabric will be boiled in a strong solution of soap and water, which will eliminate the gum or ceraceous matter and bring out the color and luster in the fabric.

The gum is therefore retained until after dyeing and weaving. The retention of the gum maintains each thread in the hank an individual element, and hence they can be readily separated when they are to be woven or thrown. The dyeing operation is not in the least hampered by the presence of the gum, as the dye will penetrate the gum but will not soften or dissolve it, owing to the hardening process. As the dye will penetrate and pass through the gum, the silk fiber will be dyed.

One of the advantages of the process is that the threads comprising a hank of silk can be treated in untwisted condition in hanks or warps; in other words, the natural gum is preserved or hardened in and on each thread composing the hank, thus enabling the storage of the hanks for dyeing at a future time. Hence, silk threads can be preserved for a considerable length of time by subjecting them to the hardening.

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## SAFETY IN THE DYE PLANT

When accidents occur and one or more persons are burned with acids or other corrosives, it is usually due to (1) mistakes in handling, (2) bad containers, (3) slopping or spattering, (4) material left in containers supposed to be empty. Also, these accidents are more often due to bad types of "tools" than to workmen or workmanship. The nails in bottoms of carboys are destroyed by sloppages, and when the carboy is lifted the bottom drops out, or the crockery pitcher is cracked and suddenly drops off the handle, or the supposedly empty carboy is turned over and spills some acid which could not be entirely drawn off when the carboy was in the rocker or inclinator, etc.

In most States laws require compensation insurance, and many concerns also carry additional protection against liability for accidents. But the policies do not repay the cost of the foreman and witnesses, and in the long run it is not only economical but decidedly more human and desirable to safeguard against accidents in so far as it is possible to do so, and certain new equipments for handling corrosives are creating widespread interest accordingly.

First, there are pails and dippers of Monel metal for handling sulphuric acid, acetic acid, caustic potash and soda bleach, and which are also suitable for solutions of most of the sulphates, sulphites, sulphides, acetates, etc. Then, there are copper pails and dippers for acetic acid



solutions and other usual uses. Rubber buckets, pitchers and dippers are available for handling muriatic acid and solutions of chlorates and chlorides. Also, but particularly for only nitric acid and solutions of nitrates and nitrites, there is a very complete line of pails, pitchers and dippers cast in aluminum.

For handling carboys there are new devices which show a complete understanding of the field and need, viz.: a carboy truck that works like a pair of scissors to fit any size of carboy; a carboy carrier which is very economical and effective for combined carrying and dumping operations when the entire contents of carboys are used; and a special carboy dumper which is designed to permit easy and accurate drawing of small quantities—to the last drop—and safeguard against slopping and accidents from loose bottom boards, etc.

From the interest and approvals already given to these equipments by safety councils and engineers, it seems likely that they will soon be desired, if not required, wherever there is any considerable manufacture or use of corrosives.

## FOREIGN DYES LICENSED BY TREASURY DEPARTMENT FOR DECEMBER IMPORT

### Germany Makes Sweeping Gain; Switzerland Loses More Ground; England Holds Her Own, and France Sends Nothing

Following is a complete list giving the types and quantities of dyestuffs for the importation of which into the United States licenses were granted by the Treasury Department, Division of Customs, Dye and Chemical Section, during December. This tabulation is being issued by the American Dyes Institute, and it is announced that anyone interested in the manufacture of dyestuffs who has not received a copy may obtain one by application to that organization's headquarters, 320 Broadway, New York City.

An appended note by the Treasury Department states: "Licenses shown by this list to have been issued for particular commodities must not be considered as a precedent or assurance that favorable action will be taken on future applications for similar commodities. The Treasury Department, Dye and Chemical Section, announces in special cases that it is its practice to consider any special evidence that may be submitted by manufacturing consumers of dyestuffs tending to prove that the American commodity, while satisfactory in general or for some lines, will not meet the requirements as to quality or adaptability for particular manufacturing purposes."

The December list shows that Germany, which dur-

ing the preceding month ranked far below Switzerland, made a sweeping recovery and sent us 149,365 pounds, as against only 92,864 pounds in November. These figures, however, are low when compared to her imposing totals of 418,344 pounds in October and 488,912.8 pounds in September. Germany heads the list this month, with Switzerland by no means a bad second. The Country of Cantons forwarded to American dye consumers during December a total of 120,702 pounds, representing a decline from the 189,018 pounds sent in November, and a further decline from the 316,531 pounds of October. England contributed 38,720 pounds, substantially the same as in November, when she forwarded 38,330 pounds, and a substantial gain over the 33,103 pounds of October and a further gain over the 29,010 pounds of September. Once more France fails to figure in the month's list of licensed importations, the 880 pounds sent here in October representing the only contribution from that source in several months.

The total quantity of dyes imported, under license, during December was 308,787 pounds, as against 320,212 pounds in November, 768,858 pounds in October and 621,190.8 pounds in September.

The detailed list follows:

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Aceto Purpurine SB.....	880	....
Acid Blue RBF.....	....	297
Acid Pure Blue R Supra.....	....	500
Acid Rhodamine BG.....	100	....
Acid Rhodamine 3R.....	....	1,540
Acid Violet BW.....	100	....
Acid Violet 6BN.....	....	264
Acridin Orange.....	....	440
Algol Blue 3G Powder.....	214	....
Algol Brilliant Violet 2B Powder...	200	....
Algol Brown R Powder.....	200	....
Algol Corinth R Powder.....	50	....
Algol Orange R Powder.....	100	....
Algol Red B.....	1,000	....
Algol Red B Powder.....	258	....
Algol Red 5G Powder.....	50	....
Algol Violet B Paste.....	100	....
Algole Blue 3R Powder.....	20	....
Algole Green B Powder.....	20	....
Aliz. Black WX Ex Paste.....	2,500	....
Aliz. Blue Black B.....	100	....
Aliz. Blue Black B Powder.....	500	....
Aliz. Blue G Powder.....	200	....
Aliz. Blue SAE.....	500	....
Aliz. Blue SAWSA.....	1,500	....
Aliz. Blue SB Powder.....	25	....
Aliz. Blue SKY.....	100	....
Aliz. Claret R.....	200	....
Aliz. Cyanine Green 3G Powder....	300	....
Aliz. Delphinol BS (from England 520 lbs.) .....	....	....

(Continued on page 56.)

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

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## CORRESPONDENCE

In the December number of the REPORTER, on page 10 of the Proceedings of the Association, there was published a letter received by the president from the secretary of the Society of the Dyers and Colorists. We now publish the following reply to this letter.

November 28, 1921.

A. SILVERWOOD, HON. SEC.,  
SOCIETY OF DYERS AND COLOURISTS,  
BRADFORD, ENGLAND:

Dear Sir—Enclosed you will find an official reply to your letter of October 25. The long delay in replying has been due to the fact that I had hoped to be able to send you a complete copy of the proceedings of our inaugural meeting. For various reasons the publication of this has been unavoidably delayed, and I have therefore decided to write to you without any further postponement.

For the time being the AMERICAN DYESTUFF REPORTER is to act as the official journal of our Association, publishing our proceedings, etc. The December number will contain a complete report of our inaugural meeting, and I will forward a copy to you as soon as it is published which will probably be in about a week. We should be pleased to have you give as much publicity as you think advisable to the formation of this Association in the "Journal of the Society of Dyers and Colourists," particularly in regard to the fact that the American organization would be pleased to co-operate in every way possible with the British Association.

I received this morning the prospectus of the Color Index, to be published by the Society of Dyers and Colourists. This will be an extremely valuable publication and we shall all be glad to get away from the more or less stereotyped Schultz tables and continual reference to them. I do not know what scheme you have followed out in regard to American dyes, but I trust that every effort is being made to incorporate an accurate record of American made dyes along with the others.

Some time ago I wrote to you inquiring in regard to the possibility of publishing a collective index of the "Journal of the Society of Dyers and Colourists." I suppose, with the publication of this Color Index on your hands at the present time, you have all that you can take care of without any additional work. I still believe, however, that the publication of such a collective index of the "Journal" would be extremely valuable and well subscribed for. I should like to know if plans for this were entirely given up, or whether it is still the intention of the Society to publish such an index at some future time.

In closing, I wish to personally assure you of the co-operation of the newly formed American Association in every way, and I trust that as early as possible you will send a reply to my enclosed letter which may be presented to the Council of the American Association of Textile Chemists and Colorists.

Sincerely yours,  
(Signed) LOUIS A. OLNEY

The following letter is in reply to the one published above and another unpublished letter in regard to the Color Index which is being published by the Society of Dyers and Colourists and also in regard to the publication of a collective index of the thirty-seven volumes of their journal.

SOCIETY DYERS AND COLOURISTS

December 28, 1921.

PROFESSOR LOUIS A. OLNEY,  
LOWELL TEXTILE SCHOOL,  
LOWELL, MASS.:

Dear Sir—I thank you for your letter of the 25th ult., along with the official letter from the American Association of Textile Chemists and Colorists. These were brought before my Council at the last meeting and I was instructed to offer any assistance that we can give you.

We were unable to suggest any concrete scheme of co-operation as we had very little knowledge of the progress you have already made.

We notice that you have made arrangements for



## Proceedings of the American Association of Textile Chemists and Colorists

monthly publication and we think that this is the most important point. In our own case, success depends largely upon the quality of our "Journal," which is itself an indication of the amount of work done for the Society.

We have found the formation of local Sections to be a great help to us and we venture to suggest that you might profitably follow our lead in this.

If you have thought of any scheme of co-operation or come across any point on which we might help, we shall be pleased to hear from you.

With reference to the other matter in your letter, every effort has been made to obtain an accurate record of all American dyes and we have already received from some makers all the information we required.

The Collective Index of the "Journal" would most likely have been in hand at the present time if we had not decided upon the publication of the Color Index. It is hoped to proceed with this during the coming year.

Yours sincerely,

(Signed) A. SILVERWOOD.

Table I (below) and Table II (right) are supplementary to Wallace J. Murray's paper on "Differential Reduction of Vat Dyes," which was published in the issue of January 2. The tables were omitted at that time because of lack of space.

TABLE II

## Sulphur Colors

Dye Used	Reaction with	
	Sodium Hydrosulphite	Sodium Sulphide
Brilliant Sulphur Blue BG Conc. Grasselli	Orange	Dark brownish purple
Sulphur Brilliant Blue 6B An. Dyes and Chem.	Yellow	Greenish brown
Sulphogene Navy Blue RC Du Pont	Yellow	Greenish brown
Sulphur Sky Blue B Amer. An. Prod. Co.	Orange	Greenish blue
Sulphur Indigo Blue B Newport	Orange	Violet

TABLE I.

Reducing Agent	Temp.	Reaction	Indigo	Midland Blue 5B	Midland Vat Blue MB	Midland Blue R	Ciba Blue 2B	Indigo Pure ADC	Hydrone Blue B	Anthrene Blue GCD	Anthrene Dark Blue B.O.	Thio Indigo Red B	Sulfam Indigo Blue B
Sodium Hydro-sulfite	Boiling	Speed of Reduction	rapid	rapid	very rapid	very rapid	very rapid	rapid	rapid	rapid	rapid	rapid	rapid
		Color Solution	yellow	yellow	yellow	yellow	yellow	yellow	yellow	red-brown	red-purple	yellow	orange
		Dyeing	good	good	good	good	good	good	good	poor			
		Condition	clear	clear	clear	slight ppt.	clear	clear					
	Cold	Speed of Reduction	moderate	moderate	moderate	moderate	rapid	moderate	slow	rapid	rapid	moderate	moderate
		Color Solution	yellow	yellow	yellow	yellow	yellow	yellow	yellow	red-brown	red-purple	yellow	yellow
		Dyeing											
		Condition	finally clear		clear	slight ppt.	clear						
Sodium Stannite	Boiling	Speed of Reduction	slow	rapid	rapid	rapid	rapid	rapid	rapid	slight	moderate	rapid	very rapid
		Color Solution	green	yellow	pale orange	yellow	yellow				red-purple	yellow	orange
		Dyeing	poor					good					
		Condition	turbid	not clear	orange ppt.		clear	yellow					brown ppt.
	Cold	Speed of Reduction	almost none	moderate	moderate	moderate	moderate	moderate	moderate	very slow	very slight	very slow	rapid
		Color Solution	greenish	yellow	yellow	yellow	yellow	yellow					orange
		Dyeing											
		Condition	undissolved	precipitate	yellow ppt.		poor brown ppt.						brown ppt.
Sodium Sulfide	Boiling	Speed of Reduction	none	slight	slow	very slight	moderate	fair	very slight	none	none	moderate	rapid
		Color Solution	blue	green	orange	yellow	orange	green				orange	violet
		Dyeing	none				good	fair				good	
		Condition	undissolved	large ppt.	ppt.	ppt.		uncamp. red					
	Cold	Speed of Reduction	none	none	none	none	very slight	none	none	none	none	slight	rapid
		Color Solution	blue	blue									violet
		Dyeing	none										
		Condition	undissolved	undissolved	undissolved	undissolved							

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 Proceedings of the American Association of Textile Chemists and Colorists
 

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**NOTICE FROM THE SECRETARY**

Owing to the date on which the January 16 issue went to press, there was no opportunity for the preparation of material for an account of the recent meetings of the Council and of the Research Committee of the Association, which were held Friday, January 13, at the Engineers Club, Boston, at 4 P. M. and 4.30 P. M. respectively. These will appear in the January 30 issue of the Proceedings.

All members of the Association are urged to follow the suggestion of the president that letters be written stating the type of material they would like to see published in this section, since it is the desire of those responsible to publish all available or obtainable material which might be interesting or useful.

It is again suggested that all individuals who believe they are eligible for membership in the Association, or members acquainted with such individuals, communicate with the secretary, who will furnish application blanks and extend every possible assistance.

W. E. HADLEY, Secretary,  
5 Mountain Avenue, Maplewood, N. J.

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**VOLUNTEERS WANTED TO ASSIST IN  
GERMAN TRANSLATION**

The following letter from H. A. Mereness to E. H. Killheffer, and the latter's reply thereto, are self-explanatory. It is hoped that some members may be sufficiently interested to offer their services as collaborators with Mr. Mereness in this work. Any member who is willing to assume responsibility for the translation of a few chapters should communicate with Mr. Killheffer at the Newport Chemical Works, Passaic, N. J.

163 Mt. Pleasant Street,  
New Bedford, Mass.,  
January 10, 1922.

MY DEAR KILLHEFFER:

As chairman of the Library and Publication Committee you are perhaps the proper person to consider the following proposition:

I have a copy of a book by F. Erban, entitled "Amwendung von Fettstoffen in der Textil Industrie," and, after having used it for a couple of years, have concluded that its merits warrant translation. It contains 360-odd pages on the application of fatty products to textiles, including about ninety pages on the manufacture of Turkey Red Oils and similar products. Its references to patents and literature are complete (as most German books are likely to be). Several of the fellows who have seen it thought it might be a good idea to make the translation.

I do not feel that I could undertake the translation of

the whole 360 pages single-handed but thought that three or four of us in the Association might take those parts with which we are most familiar and thus get the translation done in a manner not burdensome to any one.

The book is not copyrighted. Are you interested and do you care to see the book?

Very respectfully,  
(Signed) HARRY A. MERENESS.

January 13, 1922.

HARRY A. MERENESS,  
163 MT. PLEASANT STREET,  
NEW BEDFORD, MASS.:

Dear Sir—I have your letter of January 10 and believe that a translation of the book you have would be very interesting indeed.

Perhaps it could be arranged that a number of translators could have a hand in the work; for instance, each man to take several chapters and in that way the entire burden would not rest on any one person.

I will put a notice calling attention to this matter in with the other notices of the Association in the next issue of the AMERICAN DYESTUFF REPORTER, and perhaps we can secure enough volunteers to put the work through.

Yours very truly,  
(Signed) ELVIN H. KILLHEFFER.

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**INAUGURAL MEETING, RHODE ISLAND  
SECTION**

Held Friday, December 30, at the To Kalon Club,  
Pawtucket, R. I.

A MEETING to organize the Rhode Island Section of the American Association of Textile Chemists and Colorists was held on Friday, December 30, 1921, at the To Kalon Club, Pawtucket. Notice of the meeting having been sent to all members of the Association located in Rhode Island.

Following an informal dinner the meeting was called to order at 8 P. M. by William H. Cady, vice-president of the Association, who announced that a petition signed by twenty-six members, requesting the formation of a Rhode Island Section, was presented to the Council on November 18 and approved by them. It was unanimously voted to organize the Section at once and Mr. Cady was elected temporary chairman, and Henri N. F. Schaeffer temporary secretary. The chairman was authorized to appoint a committee of five to prepare nominations for permanent officers of the section and present them at the next meeting. The following were appointed:



Ralph F. Culver, chairman  
Peter J. Ariento  
Nelson Barlow  
John A. Kydd  
Henri N. F. Schaeffer

This committee was also instructed to arrange a program for the next meeting. It was voted to hold meetings every six weeks except in summer. A poll of the members indicated a preference for Friday evening. The chairman announced that he was negotiating with the Providence Engineering Society and hoped to secure the use of the Society rooms for the meetings of the Section.

Roscoe L. Chase, former manager of the Arnold Print Works, gave an informal talk on "Mercerizations" (see abstract which follows). At the close of the discussion a vote of thanks was accorded to the speaker.

The chairman gave a brief account of the work of the Council and outlined the plans of the Research Committee for a systematic investigation of the problem of standardizing methods of determining the fastness of dyes on the various fibers (to washing, light, etc.).

The meeting adjourned at 9.25. Twenty-six members and two guests were present.

## MERCERIZATION

[Abstract of an address delivered by Roscoe L. Chase before the Rhode Island Section of the American Association of Textile Chemists and Colorists at the To Kalon Club, Pawtucket, R. I., on Friday, December 30, 1921.]

The speaker first gave a brief history of the evolution of the art of mercerizing since Mercer's time, pointing out that Mercer's original patent, taken out in 1851, covering the action of caustic alkalies on cotton, referred only to the shrinkage produced and the increased affinity for dyes. The possibility of obtaining a luster by treating cotton with caustic under tension was not discovered until 1889, when Lowe in England took out a patent, followed in 1895 by Thomas and Prevost in Germany.

Caustic soda is universally used as a mercerization agent, and the speaker called attention to the fact that there are three different methods of comparing the strength of commercial caustic; namely, the Castner electrolytic method, which expresses in degrees the actual percentage of  $\text{Na}_2\text{O}$  present; the Newcastle method, based on an erroneous atomic weight for sodium, which gives figures 1.3 per cent higher than the actual values; and the New York and Liverpool method, even less correct, which gives figures more than 3 per cent too high. This makes it advisable for

the purchasing agent in buying caustic to specify the particular method by which its strength is to be calculated.

The lecturer next described the various types of mercerizing machines which have been used from time to time, mentioning in particular the Kleinewefer centrifugal yarn machine, now obsolete, which rotated at 1,800 revolutions per minute, and depended on centrifugal force to counteract the shrinkage; and, passing to cloth mercerization, he referred to various early attempts to prevent transverse shrinkage, notably that of Jeanmaire, who passed the impregnated cloth over a series of cylinders with roughened surfaces. When tenter frames first began to be used, for the purpose of preventing shrinkage, it was the custom to roll up the cloth from the pad and let it lie and subsequently tenter and wash. During those early days various schemes were suggested for reducing the tension due to shrinkage, such as the addition of alcohol, naphtha, mineral salts, etc., to the caustic, but none of these ideas ever met with much success.

The speaker described in an interesting way a visit which he made in 1902 to several of the largest mercerizing plants in Europe, and went on to compare the relative merits of mercerizing cloth in the gray and in the bleached state, pointing out in particular that strong caustic soda acting on starch tends to make it insoluble, consequently it is advisable in mercerizing gray goods to remove the starch beforehand, either by the action of diastase or by souring. With regard to the actual time required for complete mercerization, he stated that there is some difference of opinion, the estimates ranging from thirty seconds to one minute. The mercerizing action increases as the strength of caustic is increased, and decreases with increase of temperature. In plants where all the wash water from mercerizing is recovered and used in the kiers, this is not of great importance, but where the recovered caustic is in excess of the needs of the bleach house, the total quantity required for mercerization can be often reduced by keeping the temperature down.

(To be concluded.)

## CHANGES OF ADDRESS

GOLDTHWAITE, CHARLES F.,  
1107 North Fifty-ninth Avenue,  
West Duluth, Minn.  
PUTNAM, PHILIP C.,  
Apponaug Finishing Company,  
Apponaug, R. I.  
BAILEY, SIDNEY,  
1103 Spruce Street,  
Philadelphia, Pa.  
KIDD, THOMAS E.  
Wilton, Me.

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

*Advisory Editor*

LAURANCE T. CLARK

*Managing Editor*

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No. 2

## BRITISH DYE CONSUMERS AND THE LICENSING SYSTEM

IT is now a little more than a year since England passed her Dyestuffs Import Regulation Act, and during that time the various elements of the trade directly concerned with it have had ample opportunity to adjust themselves to the situation, which is to last ten years from the date of enactment. The British law, as is well known to the reader, is based on the licensing system, and since in this country we have been and shall continue to be subject to this system of dye import regulation until Congress can straighten out the tangle, it should be interesting to reflect for a moment upon the manner in which its restrictions and, in many cases, disadvantages—as compared with the proposed American system—have been ameliorated abroad.

The licensing system, as a possibility here, is dead. But because comparisons are constantly being made by those endeavoring to influence pending legislation, it has not yet entirely lost its rating as a controversial subject. When new schemes are suggested, they are usually measured against the licensing system because it is the existing one, and so serves as a standard for appraisal.

Of any system for safeguarding our dye industry, two questions may be asked, which, if answered satisfactorily, constitute an infallible test of desirability. These are:

1. Does it protect the dye industry sufficiently to guarantee its permanent existence in this country?
2. Does it interfere with the efficient conduct of the dye consumer's business to a point where he cannot offer the same competition to his foreign rivals that he could without it?

If the first question can be answered with a "yes" and the second with a "no," any system will do. There

are literally hundreds of by-issues which can be raised, and which are constantly being raised. These serve only to becloud the situation. They may at times, and to certain individuals, seem to bear directly upon the main subject, but with such an instrument as the Sherman anti-trust law ready to be made use of, and ordinary native common sense, such fancied contingencies as the possible building up of a great dye octopus here, for instance, have little weight with the majority of us.

England will operate under the licensing system for nine years to come. Of this system it may be said that while it fulfills the first of the two above-mentioned conditions, it fails in the second respect unless administered with considerably more care and judgment than seems to be possible of attainment here.

Perhaps it would be better to say: . . . than any administrative body, Government or otherwise, seems to be willing to undertake to furnish.

At all events, the British, with characteristic thoroughness, have made the licensing system come nearer to fulfilling the second requirement than opponents of this system are willing to admit can be attained in America—which, after all, is the principal reason why we are now endeavoring to find a substitute equally well equipped with "teeth," but less fraught with "red tape."

The British law is administered by a Licensing Committee, and the Colour Users' Association began co-operating with this body as soon as the law was enacted, with pleasing results. This Association makes its influence felt through its Technical Advisory Committee, which endeavors to facilitate the procedure to obtain licenses for the importation of foreign dyestuffs by supplying the Licensing Committee with all the specific data necessary to the proper appreciation of the dye users' interests; and the Association has been instrumental in establishing two leading principles in the granting of licenses. These are: First, that the onus of proof of quality is placed upon the dye manufacturer; and second, as a *quid pro quo*, the onus of proof of price being unduly disadvantageous is upon the dye consumer.

With these as a nucleus, a working basis is at once established and cordial relations between consumers and the Licensing Committee are made easily possible. H. Sutcliffe Smith, President of the Society of Dyers & Colourists, and Chairman of the Dye Users' Association, recently pointed out that certain corollary principles had been mutually agreed to and indorsed by the Council of the Association which, if minutely adhered to, would tend to more expeditious considerations of applications for licenses to import, and would also assist the Association's nominees in supporting applications and seeing that licenses were granted where the necessity of importation had been established.

It is stated, for instance, that in cases where there is admittedly no British equivalent, licenses for reasonable quantities will be granted without challenge



—either to consumers or to dye agents. It is in cases where it is claimed that a British equivalent exists that delay may occur, and consumers are urged, therefore, to apply, whenever possible, in their own name for their requirements.

Among the reasons advanced for this request is the one already referred to, namely: that when a British-made dye is offered as an adequate substitute for a foreign one, it rests with the British manufacturer to prove that his product is actually a satisfactory equivalent.

As to the method of accomplishing such proof, *prima facie* evidence can be produced by laboratory tests, but finality can be achieved only when the manufacturer demonstrates the quality of his wares to the actual user, who must be satisfied that the proffered substitute will fulfill all the requirements of his particular trade. And, as the British view it, this is impossible if the user does not disclose his identity.

Right there we have an obstacle which prevents the licensing system—from the American standpoint, at least—from meeting the second requirement. The necessity for so much unwelcome publicity in connection with an order for foreign dyes of a certain kind would be extremely distasteful to the American consumer. And what is more, it would be neither fair nor even necessary to burden him with this penalty in order to protect our dye manufacturers. There are other ways of accomplishing the same end.

Mr. Smith's statement of principles further sets forth the contention that it cannot be too clearly impressed that unless the necessity of importing a foreign dye can be demonstrated, licenses to import cannot easily be obtained. Then it particularly emphasizes a point which alone would be enough to sound the death knell of licensing as a permanent institution in this country. It insists that applications for licenses should embody clearly defined reasons why importation is desired, and maintains that general statements, such as "This color is required because of its good dyeing qualities," are not regarded as effective.

The Council further indorses the principle that, wherever possible, the necessary qualities of the dyes should be specified, such as suitability for a particular process, solubility, fastness, shade, etc. In cases where British-made dyes have been tried as substitutes and have been found unsatisfactory, delay will often be avoided, under their system, if this is made known with a statement as to the respect in which the British dye is deficient, as to the date of trial, and as to whether or not the British manufacturer has been advised of its unsuitability.

Where an application has been refused, and the suggested substitute of British make has been found to be unsatisfactory, the consumer is urged to make a further application at once, stating as specifically as possible the shortcomings of the British color. In this connection, the Technical Advisory Committee of the Color Users' Association can be, it is declared, of ma-

terial assistance in strengthening the claims for a license, and it is desired, therefore, that all such cases be reported to the Secretary of the Association.

When a difference in price between the British and the foreign dye operates to the serious disadvantage of the consumer, the latter is expected to accompany his application for a license by a statement demonstrating the extent to which he will be placed in a disadvantageous position by the refusal of a license.

Now, all this is not so very unreasonable, it will be granted, when one considers the inherent difficulties of administering a licensing law. But, reasonable or not, these requirements constitute the chief cause for the defeat of all attempts to get permanent license legislation here, and the chief reason why the sooner the present license system is done away with, and something less onerous to the consumer substituted therefor, the better it will be for both American consumer and manufacturer.

And out of all the substitutes which have been proposed so far, the selective embargo system now being considered by the special Congressional committee, while not perfect, comes nearer to fulfilling the two main requirements than any.

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## INTERNATIONAL BUSINESS AND THE EXCHANGE SITUATION

HELPFUL lessons for those interested in the settlement of the international dyestuff legislation situation may be found in the recent report on depreciated exchange issued by the U. S. Tariff Commission, inasmuch as the report considers present world exchange conditions from the standpoint of the degree of price and wage adjustments to a gold basis among the chief commercial countries, instead of the paper prices and wages in those countries.

These price studies take the form of (1) tables showing the value of foreign currencies compared with their value on the same date in terms of gold or American exchange, and (2) price comparisons, reduced to a gold basis, of a number of specific products in the various markets of the world. Briefly stated, the comparison by index numbers shows that after England and France in March, 1919, withdrew their governmental support of the exchanges, such exchanges quickly fell below their value in terms of domestic commodities for England and France. That is to say, the pound and franc thereafter were worth more in terms of English and French goods than they were worth in terms of gold.

This condition was favorable to an increase of imports from these countries to the United States. In 1921, however, paper prices in these countries, as measured by index numbers, had risen, relative to American prices, about as much as their exchange had fallen, with the result that there was no special inducement because of exchange rates for buying goods in England and France.

In the case of Germany, however, there is yet a great discrepancy between the internal value of the mark and its gold value. This was slightly more than 2 to 1 during the year just ended.

The prices of specific commodities in various countries tell, in general, the same story. The gold prices of copper, wheat and wool are about the same in the United States, England and France, with a lesser degree of adjustment for Germany. Therefore, except for daily fluctuations, the prevailing rates of exchange do not seriously disturb the trade in such products among the allied countries. Specialties, however, such as articles of fashion, or complicated chemical and metallurgical products, are often priced locally in Europe in terms of paper money, with the result that special bargains may be obtained by American buyers because of the low rates of exchange. This bonus on exports from central Europe is partly offset by the numerous restrictions to trade in exportable products, such as dyestuffs, among others, and indicates clearly what the situation would be with respect to such commodities were the restrictions removed or rendered less effective. This should be particularly noted by students of our own pending dyestuff legislation.

An interesting comparison of wages in the United States, England, France and Germany shows that they are less adjusted to a gold basis than are the prices. In May, 1921, the standard wage in Germany for factory workers was, roughly, 10 cents per hour in gold, as compared with 20 to 25 cents in France, 30 to 40 cents in England, and 50 to 75 cents in the United States. In the case of Germany, however, the gold value of wages is not as significant for some purposes as is the value in terms of commodities. Measured by wholesale prices in Germany, the wages quoted above were 16 to 18 cents per hour in May, 1921, and, expressed in terms of the worker's cost of living, they were 22 to 27 cents per hour for the various industrial centers.

The report indicates clearly that it would be difficult, although not absolutely impossible, to determine and administer offsetting duties against exchange rates. A flat rate obviously could not be applied because of the varying degrees of depreciation of exchange in different countries, but a list of some commodities for which special protection is sought could be prepared and revised from time to time to meet changing conditions.

It is principally in the case of synthetic organic chemicals that almost insurmountable difficulties would be encountered by those attempting to work out such a system for the protection of our own industry, for, added to the conditions outlined above, we have to add the enormous advantages in the efficiency of manufacture enjoyed by the German dye manufacturer over his American would-be rival, and also the many methods of trickery for evading duties to which this industry peculiarly lends itself. In fact, this last factor alone would seem to be more than enough to preclude

the regulation of German dye imports by a series of movable duties based on any list, "revised" or otherwise.

### THE ENGLISH COLOUR INDEX

INTEREST in the efforts of the Society of Dyers and Colourists to prepare a Color Index in English which shall be international in scope and comprehensive in detail is steadily growing, and with the appearance of specimen pages in the November issue of the "Journal" of the Society, received an added impetus. The arrangement of the matter, which was arrived at after mature consideration by the committee under the chairmanship of Ernest Hickson, should insure the maximum amount of information in the minimum amount of space.

Progress in the work on this undertaking, which is considerable, is announced as satisfactory. The work of compilation was begun on September 1. The Index must, of necessity, bear a certain resemblance to other reference books of a similar type which have been published in the past, but in order to insure accuracy, every reference to patents, publications in scientific and technical literature, etc., has been traced back to its original source, verified, amplified—if necessary—and brought up to date; and about one-quarter of the entire Index (representing Index Numbers 1 to 300) has been collected, edited, and prepared for the press.

It is announced that the statement to the effect that the first of the twelve parts of the Color Index would be issued toward the end of the year must be somewhat revised, as there has been unexpected and unavoidable delay in the preparation of the column dealing with the commercial names of dyes—a most intricate and confusing subject! It is an excellent augury for the ultimate success of the enterprise, however, that the great majority of the leading dye manufacturers have promised active support, agreeing to supply the necessary information. Some little time, nevertheless, must elapse before all this can reach the compilers, particularly in the case of manufacturers outside of England.

To insure greater accuracy, it is planned to submit proofs for correction or amplification to a thoroughly competent Revision Committee, as well as to each firm of dye manufacturers whose products are dealt with in the Index; and, as before stated in these columns, the high standing and unquestionable authority of those engaged in directing this venture place its worth beyond all doubt.

Once again, all American dye manufacturers are urged to offer and render all possible aid to the compilers of this Index. If any American manufacturers have not as yet sent complete information regarding their various products to the committee, they should do so immediately. Communications should be addressed to Ernest Hickson, Chairman Committee on Colour Index, Society of Dyers & Colourists, Pearl Assurance Building, Market Street, Bradford, England.



**FOREIGN DYES LICENSED BY TREASURY  
DEPARTMENT FOR DECEMBER IMPORT**

(Continued from page 48.)

			Germany	Switz.
			(lbs.)	(lbs.)
Designation of Dye				
Aliz. Fast Blue BHG.....	50	....	Chlorantine Fast Black B.....	440
Aliz. Green S 15% Paste (from Eng- land 1,500 lbs.).....	....	....	Chlorantine Fast Blue 2GL.....	4,785
Aliz. Orange A.....	100	....	Chlorantine Fast Blue RL.....	6,490
Aliz. Red (Yellow Shade) (from England 4,910 lbs.).....	....	....	Chlorantine Fast Bordeaux 2BL....	550
Aliz. Red S Powder (from England 1,000 lbs.).....	....	....	Chlorantine Fast Violet BL.....	330
Aliz. Red SDG.....	50	....	Chlorantine Fast Violet 4BL.....	1,034
Aliz. Red SX 20% Paste (from Eng- land 500 lbs.).....	....	....	Chlorantine Fast Yellow 4GL.....	330
Aliz. Rubinol R.....	1,150	....	Chlorantine Fast Yellow RL.....	1,980
Aliz. Rubinoles R Powder.....	220	....	Chromazurine P Powder.....	1,100
Aliz. Saphirole B.....	4,200	....	Chrome Brown TY.....	360
Aliz. Saphirole SE.....	600	....	Chrome Printing Red Y Powder....	100
Aliz. Saphirole SE Powder.....	300	....	Chrome Violet VM Paste.....	5
Aliz. Saphirole WSA.....	300	....	Ciba Blue 2B Powder.....	1,050
Aliz. Saphirole WSA Powder.....	500	....	Ciba Blue 2BD Paste.....	13,200
Aliz. Sky Blue B.....	500	....	Ciba Blue G Powder.....	24
Anthracene Blue SWGG Ex. Powder	50	....	Ciba Green G Paste.....	1,540
Anthracene Brown EB.....	200	....	Ciba Orange G 10% Paste.....	330
Anthraflavone GC Paste.....	1,600	....	Ciba Pink BG Paste.....	1,100
Anthraquinone Blue SR Ex. Powder	50	....	Ciba Pink BG Powder.....	770
Anthraquinone Violet Powder.....	50	....	Ciba Red R Powder.....	275
Autol Orange 23211.....	1	....	Ciba Red R Paste.....	380
Benzo Chrome Black Blue B.....	200	....	Ciba Scarlet G 20%.....	2,640
Benzo Chrome Brown 5G.....	1,500	....	Ciba Scarlet G Paste.....	2,761
Benzo Fast Blue B.....	100	....	Ciba Scarlet G 20% Paste.....	5,280
Benzo Fast Blue 4GL.....	441	....	Ciba Scarlet G Ex. Powder.....	254
Benzo Fast Red 8BL.....	3,000	....	Ciba Violet B Paste.....	9,900
Benzo Light Brown GL.....	1,000	....	Ciba Violet R Paste or Powder....	1,100
Benzo Red 12B.....	1,250	....	Ciba Violet R Paste.....	5,500
Bismarck Brown 47.....	100	....	Ciba Violet R Powder.....	270
Blue Lake.....	500	....	Cibanone Brown B Paste 20%.....	880
Bluelake 42D.....	200	....	Cibanone Brown B Powder.....	440
Bluelake 1028K.....	100	....	Cibanone Brown R.....	2,640
Bluelake 1627H.....	50	....	Cibanone Orange R.....	110
Bluelake 14228.....	500	....	Cibanone Orange R Paste.....	1,000
Brilliant Benzo Green B.....	400	....	Cibanone Orange R Powder.....	120
Brilliant Indigo 4G.....	100	....	Cibanone Yellow R Powder.....	154
Brilliant Milling Blue B.....	100	....	Cloth Fast Brown 2R.....	220
Brilliant Sky Blue 5G.....	1,000	....	Cloth Fast Orange R.....	220
Brilliant Sky Blue 8G Extra.....	4,150	....	Cloth Fast Violet R.....	55
Brilliant Sky Blue 2RM.....	4,000	....	Cloth Fast Yellow 5G.....	275
Brilliant Violet 2B Powder.....	100	....	Congo Fast Blue B.....	190
Canelle ALX.....	5	....	Cross Dye Green B (from England 2,240 pounds).....	....
Carmin 1762H.....	10	....	Cross Dye Green 2G Conc. (from England 16,450 pounds).....	....
Carmine 2683Z.....	100	....	Crystal Violet Ex.....	600
Chicago Red 111.....	....	500	Cyananthrol BGAOO.....	500
Chinoline Yellow KT Ex. Conc.....	25	....	Cyananthrol BGAOO 100%.....	500
Chinoline Yellow, soluble in spirits.	2	....	Cyanole Extra.....	235
Chinoline Yellow XT Ex. Conc.....	100	....	Cyanole FF.....	220
Chloramine Red SFS.....	1,000	....	Deep Black 6 Paste.....	5
			Developer B.....	260
			Developer Z.....	420
			Diamine Brown 3G.....	150
			Diamine Catechine B.....	660
			Diamine Catechine G.....	100
			Diamine Fast Blue CG.....	3,000

Designation of Dye	Germany (lbs.)	Switz. (lbs.)	Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Diamine Fast Blue FFB.....	3,000	....	Indan. Blue BCS Powder.....	15,525	....
Diamine Fast Bordeaux 6BS.....	3,000	....	Indan. Blue GCD Double Paste.....	25	....
Diamine Fast Brown GB.....	3,000	....	Indan. Blue GGSNP Powder, quin- tuple .....	40	....
Diamine Fast Orange ER.....	3,000	....	Indan. Blue 3G.....	11,000	....
Diamine Fast Violet FFR.....	3,000	....	Indan. Blue WBO... ..	100	....
Diamine Orange B.....	200	....	Indan. Golden Orange G Dble. Paste	1,000	....
Diamine Yellow N 110%.....	330	....	Indan. Golden Orange G Powder...	150	....
Diaminogene Blue NA.....	3,500	....	Indan. Golden Orange RRT Paste..	50	....
Dianil Brown 3GO.....	500	....	Indan. Golden Orange RRT Paste, Sand Free .....	2,500	....
Diazo Brilliant Black B.....	1,000	....	Indan. Golden Orange 3R.....	500	....
Diazo Brilliant Scarlet B Extra....	50	....	Indan. Golden Orange 3R Paste....	1,000	....
Diazo Brilliant Scarlet G Ex. Index.	50	....	Indan. Pink BS Powder.....	25	....
Diazo Brown 3G.....	574	....	Indan. Pink R Double Paste.....	50	....
Diazo Fast Blue 2BW.....	....	660	Indan. Red BN Extra Paste.....	500	....
Diazo Fast Green GF.....	100	....	Indan. Red Violet RRN.....	720	....
Diazo Fast Green 3G.....	100	....	Indan. Violet BN Extra Paste.....	2,500	....
Diazo Fast Violet BL.....	250	....	Indan. Violet RR Ex Paste.....	300	....
Diazo Fast Yellow 2G.....	100	....	Indochrome T .....	....	550
Diazo Sky Blue B.....	1,000	....	Indigene Blue BB Paste.....	....	22
Diphen Blue R.....	100	....	Ink Blue BITBNOO.....	2,200	....
Diphenyl Fast Brown GNC.....	....	500	Katanol .....	5	....
Diphenyl Fast Gray BC.....	....	500	Kiton Fast Red S.....	....	1,100
Erika B Extra. ....	620	....	Kiton Pure Blue V.....	....	1,980
Erio Chrome Azurol BX.....	....	500	Lanasol Brown 2R Pat.....	....	220
Erio Chrome Azurol BX Conc.....	300 gms.	....	Lithol Fast Yellow GG Ex. Lumps..	200	....
Erio Chrome Blue S.....	....	1,000	Madder Lake (from Scotland 2,000 lbs.) .....	....	....
Erio Chrome Brown R.....	....	1,000	Madderlake 71 .....	25	..
Erio Chrome Brown ROS.....	....	1,000	Madderlake 71 Extra.....	100	....
Erio Chrome Flavine A Conc.....	....	1,000	Madderlake VN .....	750	....
Erio Chrome Geranol R Conc.....	....	110	Madderlake VN14 .....	1,000	....
Erio Chrome Phosphine R.....	....	500	Methyl Lyons Blue.....	....	3,000
Erio Chrome Verdon S.....	....	940	Methylene Green G.....	....	550
Erio Chrome Yellow 6G.....	....	1,000	Milling Yellow O.....	1,000	....
Euchrysine GRNTN .....	25	....	Mounsey Olive Brown G Powder (from England 500 lbs.).....	....	....
Fast Green Bluish.....	500	....	Naphthalene Green V.....	500	....
Fast Green Extra Bluish.....	100	....	Naphtogene Indigo Blue B.....	25	....
Fast Light Green.....	5	....	Naphthylamine Brown .....	5	....
Fast Light Yellow 3G.....	600	....	Night Blue .....	10	....
Fast Mordant Yellow G.....	50	....	Nitrosamine Red Paste.....	1,000	....
Fastigen B .....	100	....	Paris Green Extra Yellowish.....	100	....
Fuscamine .....	5	....	Paste Dryer M.....	10	....
Gallamine Blue Extra Paste.....	....	2,000	Patent Blue A.....	700	....
Hansa Yellow G.....	100	....	Patent Blue A (Special).....	1,000	....
Hansa Yellow 5G Lumps.....	50	....	Patent Marine Blue LE.....	31,450	....
Helindone Golden Orange IRRP Pst.	1,000	....	Patent Phosphine M.....	....	550
Helindone Pink AN.....	1,920	....	Patent Phosphine R.....	....	110
Helindone Pink AN Paste.....	1,370	....	Peacock Blue .....	2,320	....
Helindone Pink BN.....	500	....	Peacock Blue 198N.....	100	....
Helindone Pink BN 10%.....	70	....	Peacock Blue 315BK.....	520	....
Helindone Pink BN Paste.....	650	....	Peacock Blue 315PK .....	500	....
Helindone Pink BN Powder.....	50	....	Peacock Blue 14228.....	250	....
Helindone Violet R Paste.....	500	....	Peacock Blue Lake.....	250	....
Hortensia Lake .....	200	....	Peacock Blue Lake 14228.....	250	....
Hydron Blue G Powder.....	100	....			
Hydron Blue R Powder.....	2,200	....			
Indanthrene GP Powder.....	25	....			
Indanthrene Blue BCS.....	10,035	....			



Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Philchromin B Paste.....	5	....
Phloxine Lake 1.....	1,000	....
Phosphine .....	310	....
Phosphine G 300%.....	....	220
Phosphine 3R .....	100	....
Pink Color (Aniline Dye).....	20	....
Polar Red G Conc.....	....	1,000
Polar Red R Conc.....	....	110
Polar Red RS Conc.....	....	110
Pyrogene Cutch 2R Extra.....	....	1,444
Pyrogene Cutch Brown RR.....	....	1,100
Pyrogene Direct Blue RL.....	....	275
Pyrogene Green 3G Conc. 270%.....	....	176
Pyrogene Yellow Brown NRS.....	....	242
Pyrogene Yellow Brown RS.....	....	1,244
Pyrogene Yellow M.....	....	4,400
Pyrogene Yellow C.....	....	4,400
Reflex Blue OO Lithol Quick Drying	25	....
Rhodamine 6GDN Extra.....	1,125	....
Rosanthere B .....	....	660
Rosanthere Bordeaux B.....	....	1,100
Rosanthere Orange R.....	....	990
Rosanthere Orange R Pat.....	....	55
Rosanthere R .....	....	710
Rosanthere Rose .....	....	880
Rublake .....	25	....
Saba Phosphine M Conc. (Patent).....	....	1,100
Salicine Orange 2R.....	100	....
Seiden Schwarz 4BF.....	2,200	....
Silk Blue RTBOO.....	440	....
Solanine Blue EF .....	500	....
Solidred 744H .....	200	....
Solidred 8809 .....	200	....
Soluble Blue Crystals.....	600	....
Sorbin Red X.....	1,000	....
Tetra Cyanole .....	485	....
Thio Indigo Pink AN.....	220	....
Thio Indigo Pink BN.....	220	....
Thio Indigo Rose BN Paste.....	400	....
Thionol Brown GD (from England 1,000 lbs.) .....	....	....
Thionol Brown O (from England 8,000 lbs.) .....	....	....
Thionone Isabellina (from England 100 lbs.) .....	....	....
Triazol Red B.....	....	440
Trisulfon Brown B.....	....	2,000
Trifulson Brown GG or 2G.....	..	2,000
Ursol Gray B.....	50	....
Viridin Lake 1026H.....	200	....
Viridin Lake 1027H.....	100	....
Viridin Lake 1028H.....	100	....
Wool Black GR.....	500	....
Xylene Cyanole FF Conc.....	....	1,000
Xylene Fast Green B Conc.....	....	1,000
Xylene Red B Conc.....	....	500

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Totals:		
Germany .....	149,265	
England .....	38,720	
Switzerland .....	120,702	
Grand Total .....	308,787	

#### DU PONT ANNOUNCES PONTACYL LIGHT YELLOW GG, PONTAMINE ORANGE 4G AND PONTAMINE YELLOW GR

The Dyestuffs Department, Sales Division, E. I. du Pont de Nemours & Co., announces placing the following new products on the market:

Pontacyl Light Yellow GG, which is like pre-war Fast Light Yellow G, which is well known on account of its fastness to light and excellent level dyeing properties.

Pontamine Orange 4G, which is a Direct Orange. It is of considerably yellower shade than Pontamine Orange R, previously marketed by the du Pont Company. This product possesses general good fastness, good solubility and good level dyeing properties. The fastness to washing, light and acid, rubbing, perspiration and chlorine is good. Alkali tends to change the shade redder, but after a thorough washing the redness disappears and the shade becomes normal again. It cannot be discharged. This product is suitable for cotton in all stages of manufacture, and leaves silk and wool white when dyed from a neutral bath, for which reason it should be of interest to makers of union goods as a color suitable for dyeing the cotton after the wool has been dyed. Because of this property it should also find use in the production of two-tone effects and for spec dyeing. It is not fast to cross-dyeing.

Pontamine Yellow GR. This Direct Yellow is redder in shade than Pontamine Yellow SX, now being sold by the du Pont Company. It possesses good solubility and level dyeing properties. In fastness it has the same qualifications as the Pontamine Orange 4G mentioned above. As is the case with the Pontamine Orange 4G, the shade turns reddish with the use of alkali, but returns to the original shade after a thorough washing. The product cannot be discharged and is not suitable for cross-dyeing. After-treatment with metallic salts does not improve the fastness.

Announcement has been made by the Chester Chemical Corporation, New York City, to the effect that the capital of this concern has been increased from \$10,000 to \$20,000.

Announcement has been made by C. Bischoff & Co., New York City, to the effect that the name of this company has been changed to the Carbic Color & Chemical Company.

## CHINESE NOW TRYING TO DEVELOP OWN CHEMICAL INDUSTRY

### "Made in China" Movement Spreading to All Parts of the Republic and Factories Are Being Established for the Manufacture of Crude Chemicals— An Experience with a "Dye" Factory

China and other countries of the Orient are developing chemical industries as a result of the movement started by the World War. Although, according to William Henry Adolph, of Shantung University, China, writing in the "Journal of Industrial and Engineering Chemistry," America is much admired by the Chinese industrialists, the United States has not risen to the commercial opportunities offered.

"America," he continues, "may well take a lesson from Germany's methods in stimulating chemical industry in Shantung. Her expert studied the industrial needs of the province, designed machinery and plant of a type which was not used in Germany but which was needed in China. Our American houses too often have sent their catalogues and given up in despair when an order was not received by return mail. But the Germans cultivated the market, then patiently waited, taught, established industrial schools, were patient again, and built themselves into the good graces of the people. Even now the field is still a virgin field, and it requires expensive and rather tender cultivation on the part of the industrialist and commercial man. An enterprising peanut-oil producer knows perhaps how to run an oil press, but is unable often without help to order the machine he needs from the confusing specifications of an American catalogue, and to install it.

"Americans traveling in China are astonished at the extent to which intelligent Chinese are looking to America as the source of new inspiration and help. In traveling through China the writer found the simple statement that he was an American the most powerful password that could have been given. He was still more interested in observing the care with which his Chinese associate on industrial trips mentioned that the foreign visitor was an American. It invariably meant the doors were thrown open with a willingness. This was in spite of the fact that the Chinese manufacturer has preserved a good bit of his medieval reticence, and is cautious about imparting family trade secrets.

"The situation in China divides itself into the recognition of two kinds of industries, with two kinds of industrial problems. In the first place are the old Chinese chemical industries, dyeing, glass, paper, etc., which had their origin in China's prehistoric days. In the second place are the chemical industries which are new to China, sulphuric acid, soda, tanning which are now looked upon as the foundation stones of a modern chemical industry.

"The first, the old industries, will help fill some of the pages of our history of chemical industry, and will

furnish some of the curious illustrations of how practice can race away from theory till theory is lost thousands of years behind. In China these were all small-scale industries, many of them family industries, and in most cases only supplementary to various phases of agriculture. They require a development that will enable them to retain their important position in the economic fabric of the country, and at the same time to satisfy the requirements of modern efficiency. The second, the new industries, involve serious financial problems as well as technical ones.

"The 'made-in-China' cry which accompanied the recent patriotic movement has taken a real place in the life of the country, and it has not turned out to be but a fleeting enthusiasm. High-school graduates, and ex-soldiers whose experience has been limited to the manufacture of soda-water and vending of opium pills, have set up as chemical manufacturers, and the desire to *make*, instead of *import*, will gradually affect the status of our commercial relationship with China.

"News came to us recently of a newly founded sulphuric acid plant in central Shantung, where pyrite was plentiful and fuel cheap; they were reported to be in difficulty. On arrival, our surprise was exceeded only by a certain amount of pathetic admiration. A couple of thousand dollars, all the money the investors possessed, had been expended in the erection of a small plant for the manufacture of sulphuric acid by the chamber process. There were four little lead chambers in a row, a pyrite burner was located at one end and at the other end was an outlet pipe for the excess gases. The manager, who was a high-school graduate and had studied a half-year of chemistry in high school, stepped proudly forward and explained that he had designed the plant unaided and that the completed plant was an exact copy of the diagrammatic sketch which was to be found in his high-school textbook. The plant had failed to produce satisfactory acid. The 'company' was profoundly disappointed when shown that there were a number of important details which had been omitted in the crude sketch. This is not an isolated case of patriotic enthusiasm.

"The 'made-in-China' movement also manifested itself in other ways. A short time ago there was erected a high and imposing chimney, with the elements of a factory attached to its base. In a few days the chimney started spurting heavy nitric fumes, and simultaneously with the appearance of the fumes there were scattered broadcast over the Chinese republic handbills announcing the founding of a Chinese company for the manufacture of synthetic dyes in China to replace the imported variety. Patriotic Chinese dyers responded with enthusiasm; the new made-in-China dyes prospered with alacrity. The factory became the center of some interest, but visitors were not encouraged. An investigation showed that there were two doors in the factory. Into the east door were hauled on high single-wheeled barrows cases of imported dyestuffs. On the trip through the factory the cases were



opened, labels removed and changed for made-in-China labels, and the dyes were wheeled out the west door to parade as Chinese product. The yellow smudge which appeared from the stack was kept going constantly, while the process of pasting on new labels proceeded."

### MOUREU PREDICTS BRIGHT FUTURE FOR AMERICAN CHEMISTRY

American chemistry has a brilliant future, in the opinion of Professor Moureu, President of the International Union of Pure and Applied Science, who was recently the guest of honor at a dinner at the Chemists Club, 52 East Forty-first Street, New York City, given by the American Section of the *Societe de Chimie Industrielle*.

Professor Moureu is in this country as one of the advisers on chemical warfare to the French delegation at the Disarmament Conference, and is in touch with large scale chemical operations in Europe. In replying to an address of welcome he said that he was much impressed by the many chemical activities of the United States. He predicted that this country would soon be a leading nation in chemical industry, and thus give a guarantee of peace.

In addition to his official mission here, he will also visit American institutions where he will speak on organic chemistry, of which branch of science he is a professor at the *College de France* in Paris. The French savant spoke at Columbia University on "The Natural Gases with Especial Reference to Rare Gases."

Joining with the American branch of the French society in extending a greeting to Professor Moureu were the New York Section of the American Chemical Society, represented by Professor Ralph H. McKee, of Columbia University, and the American Section of the Society of Chemical Industry, by S. R. Church, chairman; Charles A. Doremus, former president of the American Electrochemical Society's New York Section. Professor J. Enrique Zanetti, president of the American Section of the *Societe de Chimie Industrielle*, presided.

Among the guests were Professor Marston T. Bogert, of Columbia University, Dr. William H. Nichols, head of the Allied Drug & Chemical Corporation and formerly president of the American Chemical Society; Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers Association of the United States; Henry Blum, Ellwood Hendrick; Dr. George F. Kunz, Dr. Leo H. Bakeland, honorary professor of engineering chemistry, Columbia University, and Dr. Charles Baskerville, vice-president; J. V. N. Dorr, treasurer, and Professor Arthur W. Thomas, secretary of the American Section of the *Societe de Chimie Industrielle*.

The Mallinckrodt Chemical Works, Ltd., of Canada, has just purchased the property in the heart of the wholesale and manufacturing center of Montreal, situated at 468 to 482 St. Paul Street West. The building is a modern five-story and basement structure containing over 40,000 square feet of floor space.

### SCIENCE AND COTTON

Whenever a great movement is started, such as the Institution of the Cotton Industry Research Association, there are always skeptics to be found who question its practical value and demand to know what good research will be to practical spinning and weaving. Whether it was his intention or no, such doubters were given a complete answer by Dr. A. W. Crossley in an address given to the National Federation of Textile Works Managers' Associations on "The Co-operation of Industry and Science." Since science could not prevent loss from lack of knowledge, said Dr. Crossley, people in industry ought to pay for scientific research as readily as they paid for fire insurance. They might ask him what it was going to do for the cotton industry. Well, it could not do for the cotton industry what it did for the coal-tar color industry, because in the latter case science started a new industry and no one would suggest that the cotton industry was new. But the Research Association had founded the Shirley Institute at Didsbury, where it was building laboratories. The laboratories would be devoted to four departments of work: physics, chemistry, botany, and colloids. A program of research had already been outlined, but many of the problems must be referred back to the nature of the single cotton hair itself. The program included problems relating to the establishment of the various properties of the raw materials; problems relating to special branches of the industry, such as spinning and weaving; problems concerning the development of accurate methods of testing yarns and ascertaining length of staple, temper and extensibility; the effect of temperature and humidity; problems relating to sizing and the effect of sizing in the production of hard and soft warps; the effect of steam on cotton, because of the bearing of this upon dyeing and finishing; and problems of a like nature. The Shirley Institute had been established primarily for research—for the creation of new knowledge. It would certainly not put aside any practical problems which the industry wanted solving, but the main object was to strike out on new lines, to accumulate new knowledge, which would mean new processes or better processes. But the scientist could not take the place of the works expert. Life was not long enough for a man to become an expert in the works and a scientific expert at the same time. Therefore, co-operation between the two was the only way which would lead to success in the future. The main difficulty he had to encounter was to know what the practical men thought about certain problems and to ascertain what were their difficulties. He suggested that two or three members of the Managers' Federation should consider the problems of spinning, others the problems of weaving, others the problems as to sizing, and so on. They could then draw up a list of questions that needed investigation, and such a list would be of the greatest assistance to him in arranging the work to be done at the Institute.

# First Complete Translation of Japan's Drug and Dyestuff Protection Legislation Issued by U. S. Commerce Department

Translated by Commercial Attache James F. Abbott from Documents Copied in the Original Japanese by Colonel Baldwin

**F**OR the first time in this country a complete translation of Japan's existing legislation designed to foster and protect its chemical industry, especially dyestuffs, is now available through the U. S. Bureau of Foreign and Domestic Commerce, Department of Commerce, in the form of a translation by Commercial Attache James F. Abbott from documents copied in the original Japanese by Colonel Baldwin. The complete text of such legislation in English should be of great value to the American dye industry, and is herewith presented in this issue by The REPORTER.

Dr. Abbott states that he is in doubt as to the exact meaning of certain clauses referring to the methods by which accounts are to be kept, but gives it as his opinion that the excess profits and reserve funds to which the clauses refer are not likely to be called into existence in the immediate future, and for that reason are, at the time, of academic interest only.

Dr. Abbott's translation follows in its entirety:

## LAW FOR THE ENCOURAGEMENT OF THE MANUFACTURE OF DYES AND DRUGS (Act of June 21, 1915)

### Section 19

*Article 1.* Under the designation "Dyes" in this law are included ("Anilinsorte") (Anilin) dyes; (Alizarin) dyes, and artificial Indigo. Under the term "Drugs" will be included such drugs as may be designated by Imperial Ordinance.

*Article 2.* Joint-stock companies, organized according to the laws of the Empire, more than 50 per cent of whose capital and more than half of the control is held by Japanese subjects, which companies are engaged in carrying on in Japan the business of manufacturing drugs and dyes, on and after the date of the promulgation of this law may be granted a subsidy.

*Article 3.* The appointment of this subvention shall be such as to produce a dividend of 8 per cent per annum on the total paid in capital for each fiscal year. The method of calculating this dividend and of paying out this subsidy shall be determined by Imperial Ordinance.

*Article 4.* The company may not declare a dividend without the sanction of the Cabinet Minister concerned.

*Article 5.* So long as such companies are recipients of this subsidy the Cabinet Minister concerned shall have

power to supervise the business and may issue appropriate instructions for that purpose and furthermore is empowered to take over the management.

*Article 6.* Should such a company contravene the orders of the Cabinet Minister concerned or not follow his instructions regarding management the latter shall be empowered to withhold part or all of the subsidy.

*Article 7.* Should any company secure a subsidy by fraud, it shall be penalized an amount equal to the subsidy.

The penalties mentioned in the foregoing article may be collected under the regulations in force for the collection of delinquent taxes, provided that the status of any special rights previously held in respect of taxes shall be preserved.

*Article 8.* Besides dyes and drugs, in cases where chemicals and perfumes are manufactured using as a base the mother liquor resulting from the dry distillation of coal, such as may be designated by Imperial Ordinance, these shall be considered as "dyes and drugs."

*Article 9.* Raw materials for the manufacture of explosives designated by Imperial Ordinance are to be considered also as drugs and dyes.

The date of the enforcement of this law shall be determined by Imperial Ordinance. (Same was promulgated by Imperial Ordinance No. 182, October 15, 1915.)

### Amendment (Ordinance No. 224, 1916.)

*Article 1.* The following shall be designated as the "drugs" referred to in Article 1:

- (A) Acetanilid
- Benzoic acid
- Phenol
- Antipyrine
- Bromine
- Chloral hydrate
- Chloroform
- Cresole
- Formaline
- Glycerine
- Guaiacol (?)
- Potassium hydrate
- Creosote

(B) Alkaloids

(C) Derivatives and combinations of (B)



*Article 2.* The coal-tar derivatives mentioned in Article 8 shall be designated as follows:

Crude and refined glycerol (?)  
Crude carbolic acid  
Crude and refined naphthalene  
Crude and refined anthracene

*Article 3.* The raw materials for explosives mentioned in Article 9 shall be designated as follows:

Phenol  
Glycerine

*Article 4.* With regard to the dividends to be declared in connection with the law for the encouragement of the manufacture of dyes and drugs, the Government subsidy and the profit and loss account carried over from the previous fiscal year shall not be included in the profit account. The reserve fund calculated according to Article 5 of these regulations shall be subtracted from this amount and held as a reserve.

*Article 5.* With regard to the loss from the preceding fiscal year included in the Government subsidy and the profit from the preceding fiscal year not so included, should there be any other profit, one-twentieth of it shall be set aside as a reserve fund and included in the account for each fiscal year.

Should the company issue shares at a face value above par, such excess value shall also be added to this reserve fund.

The reserve fund described in the two paragraphs above shall not exceed one-quarter of the total capital.

*Article 6.* With respect to the amounts excluded from the subsidy up to the amount of the reserve fund, according to the preceding article, the Government subsidy and the loss carried over to the profit account from the profit and loss account of the preceding fiscal year shall not be considered to be a loss arising in respect of such excluded amounts of subsidy.

*Article 7.* From the profit included in the profit and loss account carried over from the preceding fiscal year, the reserve fund calculated according to Article 5 is to be deducted. If the balance exceed 8 per cent per annum of the paid-in capital stock, half of such balance shall be set aside as a special reserve. When the above balance does not exceed 4 per cent of the paid-in capital stock the whole amount shall be set aside as a special reserve fund.

As for the accumulated special reserve fund calculated according to the two paragraphs above, the loss included in the profit and loss account carried over from the preceding fiscal year shall be made up and only the profit to be estimated according to Article 4 of the regulations up to the amount of 8 per cent of the paid-in capital stock of the company shall be included in the financial statement.

*Article 8.* The subsidy must be entered as an asset when financial statements are rendered, provided that in

the discretion of the Cabinet Minister concerned such funds may be utilized for the purpose of carrying on the business.

*Article 9.* In calculating the amount of the subsidy the quotation of paid-in shares on the day they are registered shall be taken as their value.

*Article 10.* Losses arising through malfeasance of managers, auditors or other executive officials of the company which may alter the amount of the profit and loss account shall not be considered in the calculation of the subsidy which must be estimated on profit and loss arising directly out of the conduct of the business. The same shall obtain with regard to loss on account of failure to follow instructions of competent Government officials.

*Article 11.* The subsidy account may be opened or closed at any time within the limits of the fiscal year. In estimating the amount of this fund under such circumstances the profit and loss account shall be pro-rated in the same ratio to the amount of the paid-in capital stock for the period under consideration.

*Article 12.* Should the subsidy account be opened within the period of the first fiscal year, and should the amount of such subsidy for that year be inadequate to make up for the loss arising out of the business of that fiscal year then such loss shall be carried over to the profit and loss account of the following fiscal year.

#### *Supplementary Rule*

This Ordinance shall go into effect on and after the day of the promulgation of the "Law for the Encouragement of the Manufacture of Dyes and Drugs."

RULES FOR THE CARRYING OUT OF THE PROVISIONS OF  
THE "LAW FOR THE ENCOURAGEMENT OF THE  
MANUFACTURE OF DYES AND DRUGS"  
(Ordinance of the Department of Agriculture and Commerce, No. 214, October 14, 1915)

*Article 1.* Joint-stock companies receiving a subsidy under the provisions of the "Law for the Encouragement of the Manufacture of Dyes and Drugs" must have a capital, in the case of dyestuff manufacturers, of 6,000,000 yen or more, in the case of manufacturers of the raw materials of explosives, of 1,200,000 yen or more.

*Article 2.* Promoters of companies which are to receive such a subsidy must secure the permission of the Minister of Agriculture and Commerce before stock subscriptions are opened and must supply the following information:

1. By-laws of the company.
2. Number of shares taken up by each promoter.
3. Method of soliciting stock subscriptions and of allotment of shares.
4. Amount to be paid in on the first call.
5. Projected location of factory; details of equipment and anticipated date of completion.

6. Anticipated date of beginning operations.
7. Program of operations for the first fiscal year and tentative budget of receipts and disbursements.
8. The kinds of dyestuffs which it is planned to manufacture during the period of the subsidy, the estimated amount to be produced, of raw materials required and similar details of the business.

*Article 3.* Since shareholders in such companies must be Japanese subjects, in order that permission to incorporate may be secured, it is necessary that the by-laws shall include a rule to the effect that such shares must not be transferred or hypothecated to those who are not Japanese subjects.

*Article 4.* Companies are forbidden to issue shares except in the name of an individual.

*Article 5.* The amount of the capital remaining after deducting the overhead and the cost of manufacturing shall be used for continuing the business. The pro-rata of deduction referred to in the preceding paragraph must have the prior approval of the Minister of Agriculture and Commerce.

The Minister of Agriculture and Commerce has power to change this pro-rata.

*Article 6.* Application for subsidy must be made at the time articles of incorporation are filed. The foregoing application shall contain the by-laws, a transcript of the articles of incorporation, a statement of resources; of liabilities; a list of shareholders and the minutes of the first organization meeting.

*Article 7.* Permission of the Minister of Agriculture and Commerce must be secured for changes of the by-laws, of the directors or auditors through election or resignation, flotation of new shares, dissolution or consolidation with other companies.

*Article 8.* Permission must be secured of the Minister of Agriculture and Commerce for issuing a second call or subsequent calls on the unpaid-in capital stock.

*Article 9.* A tentative financial statement for each fiscal year and an account of receipts and disbursements must be rendered the Minister of Agriculture and Commerce by the beginning of the second month of the following fiscal year, and his approval secured for the same.

*Article 10.* Permission must be secured of the Minister of Agriculture and Commerce for extensions of the factory or of other equipment, purchase of land or other transfers.

*Article 11.* A statement must be rendered the Minister of Agriculture and Commerce by the twentieth of each month of the production and accounting for the previous month.

*Article 12.* A statement must be rendered the Minister of Agriculture and Commerce prior to the fixed general meeting of the shareholders of the company containing an account of assets and liabilities; of the condition of the business; profit and loss account; statement of receipts and disbursements and list of shareholders in the company.

*Article 13.* The Minister of Agriculture and Commerce

may demand at any time an accounting of the business condition of the company and a statement of its assets, may order an investigation of its books or require a general meeting of the shareholders to be called.

*Article 14.* Should any transactions of the company of its directors or auditors contravene the by-laws of the corporation or be prejudicial to the public interest the Minister of Agriculture and Commerce may void them and require the resignation of auditors and directors. He may also do the same should auditors and directors fail to carry out his directions.

### *Supplementary Rule*

The above regulations shall be in effect on and after the day of the promulgation of the "Law for the Encouragement of the Manufacture of Dyes and Drugs."

### RULES FOR CARRYING OUT THE PROVISIONS OF THE "LAW FOR THE ENCOURAGEMENT OF THE MANUFACTURE OF DRUGS AND DYES"

(Home Department Ordinance No. 13, October 14, 1913)

The following regulations shall be enforced in connection with the "Law for the Encouragement of the Manufacture of Drugs and Dyes."

*Article 1.* Companies receiving a subsidy under the provisions of the "Law for the Encouragement of the Manufacture of Drugs and Dyes" must have a capital of at least 500,000 yen.

*Article 2.* Promoters of companies that anticipate asking for such a subsidy must first secure the permission of the Home Minister before opening subscriptions for stock and must supply the following information:

1. By-laws.
2. The number of shares to be held by each promoter.
3. The method proposed for soliciting stock subscriptions and for the apportioning of the shares.
4. The amount to be paid in on the first call.
5. The proposed site of the factory; details of the equipment; and the period during which it is expected to be completed.
6. Time at which it is proposed to begin production.
7. Program of operations and proposed budget for the first fiscal year.
8. The kinds of drugs and dyes it is proposed to manufacture during the period in which the subsidy is asked, the proposed cost of manufacture, the raw materials to be employed and other details of the business.

*Article 3.* Since shareholders in such companies must be Japanese subjects, in order that permission to incorporate may be secured, it is necessary that the by-laws shall include a rule to the effect that such shares must not be transferred or hypothecated to those who are not Japanese subjects.



*Article 4.* Companies are forbidden to issue shares except they be registered in the name of an individual.

*Article 5.* The amount of the capital remaining after deducting the deficit due to the overhead and the cost of operation is to be used for continuing the business. The pro-rata of deduction referred to in the preceding paragraph must have the prior approval of the Minister of Home Affairs.

The Minister of Home Affairs has been authorized to change this pro-rata.

*Article 6.* The company must apply for the subsidy at the time its articles of incorporation are registered. There must be attached to the application for registration the by-laws of the company; a transcript of the articles of incorporation; a list of assets; statements of obligations; list of shareholders, and the minutes of the first organization meeting.

*Article 7.* Permission must be secured from the Minister of Home Affairs for any change in the by-laws of the company; election or resignation of managing directors or auditors; flotation of new shares, consolidation with other companies or dissolution.

*Article 8.* Permission must be secured of the Minister of Home Affairs for issuing the call for second and subsequent calls on the unpaid-in capital stock.

*Article 9.* A tentative financial statement for each fiscal year and an account of receipts and disbursements must be rendered the Minister of Home Affairs by the beginning of the second month of the following fiscal year; likewise any subsequent alterations in such statements must be rendered the same official.

*Article 10.* Permission must be secured of the Minister of Home Affairs for extensions of the factory or of other equipment, purchase of land or other transfers.

*Article 11.* A statement must be rendered to the Minister of Home Affairs by the twentieth of each month of the production and accounting of the preceding month.

*Article 12.* A statement must be rendered to the Minister of Home Affairs prior to any general meeting of shareholders of the company, containing an account of assets and liabilities; of the condition of the business; profit and loss account; statement of receipts and disbursements and list of shareholders in the company.

*Article 13.* The Minister of Home Affairs may demand at any time an accounting of the whole company and a statement of its assets, may order an investigation of its books, or require a general meeting of shareholders to be called.

*Article 14.* Should any transactions of the company or of its directors or auditors contravene the by-laws of the corporation or be prejudicial to the public interest, the Minister of Home Affairs may void them and require the resignation of the directors or auditors. He may also do the same should directors or auditors fail to carry out his directions.

#### *Supplementary Rule*

The above regulations shall be in force from the date

of the promulgation of the "Law for the Encouragement of the Manufacture of Drugs and Dyes."

Should a stock subscription be opened before the promulgation of this law, a report must be rendered within two months in accordance with Article 2 of the preceding regulations.

### DECLARES U. S. SHOULD PROFIT BY ENGLISH EXPERIENCE WITH GERMAN DYE TRUST

Over the signature of its vice-president, J. Nachsatz, the Atlantic Dyestuff Company, Burrage, Mass., recently sent a letter in response to an editorial in the Portsmouth "Times" dealing with the dispatch from the German Councillor at Rome to his Minister of Foreign Affairs in Berlin, which was recently printed in *The Reporter*. The letter calls the attention of the public to renewed German efforts to further their dye interests throughout the world by means of questionable trade methods, and asks that the experience of England be taken as a guide.

Both editorial and letter follow:

*Copy of an Editorial Which Appeared in Portsmouth "Times" Thursday, January 5, 1922*

#### "THE IMP AT WORK"

"A New York trade paper publishes what is claimed to be a dispatch from the German Councillor at Rome to the German Minister of Foreign Affairs in Berlin, from which the following excerpts are taken:

"In order that we may create for ourselves a favorable political situation, taking advantage of the discontent of the Italian people, and especially the Nationalists and Nittian parties, against the Powers of the Entente, a political situation which might in due course be favorable to us when Germany should be faced by fresh complications, it is necessary to strengthen this discontent in order to consolidate our situation through economic action. . . . Inundating the Italian market with German goods we will not only have a place sympathetic to Germany, because, as many of our agents and commercial representatives have verified, Italian consumers gladly accept cheap articles, but we will also create a situation for Italian industry which will render any continuation of activity impossible. This without doubt will cause such a crisis that, besides keeping Italy in constant agitation, will enable us to become the sole masters of the peninsular trade. . . . Further, such situation would enable us to purchase the Italian industries at a very low rate, which would be the key of the situation since it would also enable us to control trade between Italy and the Balkans in such a way that Italy would not compete with us for those markets. . . . Then we have the dyeing trade in Italy. . . . It is, however, necessary that in order to follow out in this branch the method of peaceful destruction advised by me, the Italian Government should not take precaution to prevent the import of coloring

matters from abroad, as otherwise it is certain that the Italian industries, which, it appears to me, are seeking American capital to support them, might assume a more solid position which it would be more difficult to destroy.'

"What a mischievous program, and what a warning to the United States."

Following is the reply of the company:

*[Letterhead of Atlantic Dyestuff Company]*

January 6, 1922.

"Editor, Portsmouth 'Times,'"

"Portsmouth, N. H.

"Dear Sir:

"Your editorial entitled 'The Imp at Work' in last evening's 'Times' emphasizes the German *modus operandi* for the future. Too much publicity cannot be given this article. It typifies the well thought out plans of armament of the militaristic element and the same inseparable spirit pervading the German people.

"Too little is known by the layman of the close relationship existing between the manufacture of organic coloring matters and explosives. The fact is that the two are indivisible, and cannot be thought of separately. You are actually manufacturing explosives when you manufacture intermediates for dyestuffs. The subject is entirely too lengthy to go into detail at this time, but suffice it to say that the average dyestuff plant can convert its operation in twenty-four hours to the manufacture of explosives. Should any desire proof to substantiate this claim, the same can be obtained with little difficulty, for the asking

"Some may think this not in full accord with the present craving throughout the world for peace as is evidenced by the present Disarmament Conference, but it must be admitted that Germany's dyestuff industry has and will not be in any way impaired.

"This automatically places Germany from the chemical and, therefore, the most important standpoint, always prepared for the most effective warfare.

"With a knowledge of this fact one can readily appreciate the thought in the mind of the 'Minister of Foreign Affairs in Berlin' as expressed by the desire to get control of the Italian dyestuff industry. The same agents are now at work at the capitals of all countries formerly dependent on the German chemical industry, spreading propaganda to bring about 'a crisis that, besides keeping them (Italy) in constant agitation, will enable us to become sole masters of the peninsular trade.' These same sinister forces have been and still are at work at Washington, pursuing either foul or fair means to bring about the elimination of the present existing licensing feature in our Emergency Tariff Bill, which, although even only partially effective—because of the many loopholes still existing—renders complete destruction of the dyestuff industry at least difficult. As a result of this effective propaganda, we find that many of our legislators have succumbed to their reasoning and even question the advisability of the retention of the licensing feature.

"If we are to retain the full benefits of a large basic—

and from a common-sense standpoint of protection—a vitally important industry, we must provide some means for its preservation. We can do no better than to profit by the experience of England where a dyestuff licensing plan has proven to be the only effective means of handling the situation.

"Your closing paragraph, 'What a mischievous program, and what a warning to the United States,' should be impressed indelibly upon the minds of our legislators for our own future protection.

"Yours very truly,

"ATLANTIC DYESTUFF COMPANY,

"J. NACHSATZ, Vice-President."

## PROPACH TO ESTABLISH DYE AND CHEMICAL BUSINESS ON PACIFIC COAST

C. Propach has announced his intention of locating in California, either in San Francisco or Los Angeles, and establishing there a business in dyestuffs, chemicals and allied products. Having covered this territory for the past twenty-five years in the interests of the Bayer Company, pre-war, Grasselli, and lately of the Geigy Company, Inc., he is thoroughly conversant with the requirements of the trade in detail, and expects to continue and increase the volume of business in these lines. Mr. Propach served in the capacity of manager of the Geigy Company's Chicago office, 2340 Commonwealth Avenue, that city, which is his forwarding address until his Pacific Coast location shall have been selected.

## CAMPBELL ANNOUNCES IMPORTANT REVISION OF PRICES ON FAST WOOL BLUES

In preparation for the expected demand for blues for both women's and men's wear, John Campbell & Co., 75 Hudson Street, New York, announce themselves in a position to furnish a selected range of Fast Wool Blues for all classes of dyeing. The company is manufacturing and featuring especially Aceko Fast Blue 2R and Aceko Cyanine 5R Extra. These colors are also known to the trade under the following designations: Coomassie Navy Blue, Buffalo Cyanone, Sulphon Cyanine, Buffalo Fast Blue, and Sulphon Acid Blue.

The Aceko Cyanines and Aceko Fast Blues, as manufactured by the company, are said to equal in shade, properties and fastness, to any of the competitive domestic or imported standards. Both of these series of colors are now offered at low prices, which will show a 50 per cent decrease since last spring.

Aceko Fast Blue and Aceko Cyanines are suitable for straight acid dyeing, chromate and top chrome methods of application. Aceko Cyanines are also neutral dyeing and find a useful application for shoddies. Aceko cyanines are fast to light and wear. Aceko Fast Blue 2R is a straight Acid Blue of splendid brilliancy and fullness of shade. Dyeings made with this color are characterized by their beauty of shade and light fastness.

Full particulars, product samples and prices will be furnished upon request to the company or any of its branches.



## PERKIN MEDAL FOR 1921 AWARDED TO DR. W. M. BURTON

The inventor of the cracking process which permits the use of 2,000,000 more motor vehicles than could otherwise be supplied with gasoline from the given consumption of crude petroleum, was last week awarded the highest honor of the Society of Industrial Chemistry of Great Britain.

This award, the Perkin Medal, was presented to Dr. William M. Burton of the Standard Oil Company of Indiana before a distinguished gathering of scientists at the Chemists' Club of New York. The Perkin Medal is reserved for the man who has made the most valuable contribution to the chemical industry each year. In 1918 Dr. Burton was awarded the Willard Gibbs medal by the Chicago Section of the American Chemical Society.

In the Standard Oil laboratories at Whiting, Ind., Dr. Burton directed the experimental and practical work which has resulted in doubling the yield of gasoline from crude petroleum.

In his speech of acceptance Dr. Burton recounted some of his experiences. Practical men in the oil industry, he said, declined to help operate a still containing 6,000 gallons of oil under pressure, flaming all over its surface and, despite its tight steel construction, leaking around the seams and rivets.

Inasmuch as steel begins to give way at a temperature of 450 deg. Cent., and inasmuch as the cracking process requires operation with temperatures at 370 to 400 deg. the disinclination of the practical workers to be anywhere in the vicinity of the still is not beyond understanding.

"Despite the narrow margin of safety," said Dr. Burton, "more than 800 such stills were put into operation before we had a single fatal accident." Other companies, under license, are now operating as many more such stills and the production of "cracked" gasoline is about 2,000,000 gallons daily. This is about one-sixth of the total produced in the United States and Canada.

The Burton process also conserves for future consumption an amount of crude oil equal to 100,000,000 barrels per year.

Russell Wiles, patent attorney for the Standard Oil Company, asserted that the work of Dr. Burton may well be regarded as an early example of the great things the chemist is to accomplish in the future, and that the "epoch-making inventions of the future probably will be those of the chemist and physicist. New developments in steam, electricity and in the automotive field are to-day generally predictable.

"The day of the chemist is here," he declared. "You hold the future of industry."

The Perkin Medal was awarded by the American Section of the British Society, through Allen Rogers, of Pratt Institute.

John M. Queeny, president of the Monsanto Chemical Works, has completed an extended business trip abroad and is back at his desk in the St. Louis office of the company.

## NOTES OF THE TRADE

Under the laws of New Jersey the Clifton Textile Company has been incorporated to buy, sell, manufacture, work, prepare, treat and in all ways handle and deal in silk, wool and other textile fabrics of all kinds, and the materials which enter into the composition of such products, and to bleach and dye and to operate as manufacturers of bleaching and dyeing materials, etc. The capital of the firm is \$125,000, and headquarters will be located at Clifton, N. J.

The Haberland Manufacturing Company has been incorporated under the laws of New Jersey with a capital of \$1,200,000 to manufacture, refine, adapt and prepare chemicals, dyes, cotton and woollen fabrics and any and every product thereof. Headquarters will be in Jersey City.

A loss of \$100,000 was sustained December 25 when the Paul Ulrich Dye Company's plant at 33 Herkimer Place, Brooklyn, was burned, including adjoining buildings. The plant of the Brooklyn Fur Dressing & Dyeing Company was threatened, but suffered minor loss only through damage by water.

*Dyestuffs* for December contains an article on "Dyes Wearing Apparel," by Louis J. Matos, Ph.D.; "Printing and Dyeing in the Bombay Bazaar," by Henry R. Band; illustrations of the National Aniline Company's exhibit at the International Textile Exposition, and many other features.

Arthur A. Lehman, formerly manager of the Chemical and Textile Department of S. Wander & Sons Chemical Company has resigned his position and started his own business. Mr. Lehman will operate in the capacity of dealer and agent in chemicals, oils and dyewood extracts.

The Chemical Sales Company, Detroit, Mich., has completed organization and opened offices in the Detroit Savings Bank Building, rooms 1027-1029. It will operate as general drug and chemical brokers, handling drugs, essential oils, dyestuffs, fine chemicals and medicinals.

The Atlantic Chemical Company, with plant at Irvington, N. J., for the manufacture of lacquers, made a plea on December 21, before Vice-Chancellor Foster, of Newark, for a restraining order against the Atlantic Chemical Works, Ltd., of Elizabeth, N. J., manufacturer of dyes and coal-tar distillates, to compel the Elizabeth company to change its name, owing to the confusion in mail and telephone orders. The Irvington company was established in December, 1918, and the Elizabeth company in January, 1921. The Vice-Chancellor assented to an agreement made by both sides to the controversy that the Atlantic Chemical Works, Ltd., of Elizabeth, should change its name within six months.

## CHINESE COLOR PREJUDICES

The Chinese, as is well known, have decided ideas of their own as to the use of colors in materials, wrappings and poster advertising, says the "Dyer & Calico Printer." Prejudices have been known to cause a Chinese customer to change his patronage merely because of the coloring of packing paper used. Though no definite rule can be applied to all commercial uses of color, it can be said generally that gold, yellow, red, bright brown, purple and certain shades of pink are good colors. Gold is a dignified color, red the color of good fortune. Imperial yellow is good for rugs, carpets and curtains. White and blue are mourning, and should be avoided, as well as green, which is associated with misfortune. The designing of posters and advertising matter should always be handled by agencies in China who are familiar with the tastes and prejudices of the communities involved.

Walter Ekstrand has become Overseer of Dyeing for the Olney Woolen Mills, Cherry Valley, Mass.

With a capital of \$20,000, the Imperial Cleaning & Dyeing Corporation has been incorporated under the laws of Massachusetts. The headquarters of the new enterprise is located in Worcester.

## Review of Recent Literature

*Coke Oven and By-product Works Chemistry.* Thomas Biddulph-Smith. Cloth; 196 pages; 62 illustrations and 7 folding plates; \$7.00. J. B. Lippincott Company.

It has been remarked that beyond textbooks written for the gas industry, no texts are obtainable for the guidance of the coke-oven and by-products works chemists. The various works on chemistry applying to gas manufacture, although extremely useful, do not by a long way meet the requirements. The author of the present work has therefore endeavored to furnish the coke-oven and by-products works manager and chemist with a concise manual covering, as far as space will allow, the general work required for the chemical control of such plants. *Contents.*—Washery and Oven. Gas. Analysis of the Gas. Flue Gases. Tar Distillation Plant. Testing of the Fractions on Tar Distillation. Estimation of "Free Carbon" in Tar and Pitch. Ammonia Sulphate Plant. Calorimetry and Pyrometry. Benzol Recovery Plant. Analysis of Crude Benzol. Commercial Benzols. The Analysis of Commercial Benzols. The Estimation of Xylene in Solvent Naphtha; Estimation of Thiophene. Estimation of Carbon Disulphite. Appendix I.—*Some Constituents of Coal Tar and Their Properties.* Appendix II.—*International Atomic Weights* (1918). Stand-

ard Solutions for Volumetric Analysis; Indicators. Factors for Correcting the Volume of Decinormal Solutions to 15 deg. Cent. Tables for Use in Volumetric Analysis; Table of Conversion Factors. Mensuration of Surfaces and Solids. Freezing Mixtures. Melting Points. Linear Expansion of Substances. Reduction of Water Pressure to Mercurial Pressure. Specific Gravity and Percentage of Saturated Solutions. Index.

*The Carbonizing Process.* J. Dumville and S. Kershaw. Bradford, "The Wool Record and Textile World." 5s. net.

This is an essentially practical and useful treatise on the practice of carbonizing wool for the removal of vegetable impurities. The early part of the book deals in comprehensive manner with the origin and characteristics of the most important vegetable impurities which become entangled in wool. Recognizing that the process of burr carbonizing rests on a chemical basis, the authors fully explain the methods of carbonizing with sulphuric acid and also with other agents. The cleansing of the wool prior to carbonizing is next dealt with, and is followed by a description of modern types of wool-washing machines, with brief mention of a machine used for recovering fiber from wash liquors. Carbonizing proper comprises five processes, viz.: (1) Steeping in acid; (2) extraction of superfluous acid; (3) drying and baking of acidified wool; (4) burr crushing and shaking to remove the carbonized vegetable impurities; and (5) rinsing and neutralizing the acidified wool in weak alkaline solution. These processes are described in sequence, with illustrations and explanations of the machines and plant used. The book is well written, and should be greatly welcomed by those engaged in the wool-carbonizing industry.

*Glossary of Textile Terms.* H. B. Custis; Manchester, England.

The number of terms related to the textile industry is so large and is constantly increasing to such an extent that a comprehensive glossary is almost an essential to anyone who wishes to keep abreast of the times. It is almost a physical impossibility for one book to contain every known term to date. Further difficulty is encountered in the growth of new terms from time to time. For that reason the glossary mentioned above is of particular interest in that its alternate pages are blank, permitting the owner of the book to make additions of new terms as he encounters them.

The book has been compiled with a view to placing in a convenient form for reference the common terms used in the cotton trade, and particularly in Manchester. Nevertheless it is of interest to those concerned in the industry throughout the world. The descriptions are given in simple language so that technical knowledge is not an



absolute prerequisite for the reader. The compilation is based on careful notes made by the author during the last twenty years.

*Cotton Spinning.* A. S. Wade. London, Sir Isaac Pitman & Sons, Ltd. 3s. net.

This is another of "Pitman's Common Commodities and Industries" series. It comprises 102 pages of a general narrative of cotton spinning as a large, world-important business. It does not deal with the technical operations of cotton spinning, however. The scope of the work is aptly indicated by the titles of the chapters, viz.: The World's Spindles; Cotton Spinning After the War; Cotton-Spinning-Mill Finance; Collective Bargaining; The Raw-Cotton Position; Early Spinning Inventions, and The Modern Spinning Mill. The book is full of interest. It deals with those larger aspects of the governance and organization of the cotton-spinning industry that are little known to people in general. Throughout the book one finds important statistics of the trade which clearly indicate the size and intricacy of the cotton-spinning industry. On page 94, in remarking on extraordinarily fine yarns, the author says that "up to 10,000's has once been spun, a pound of which would reach 4,776 miles."

*Bleaching.* S. H. Higgins; London, England.

The title of this book is rather misleading, since the author does not attempt to give an account of the subject of bleaching but rather to discuss the important researches bearing on the bleaching industry published during the period 1908-20, and to present a record of the work as a basis for the extension of research in the industry. The latter is the real purpose of the book, and Mr. Higgins has accomplished it well by approaching the subject from a scientific standpoint and by supplementing empiricism with as much scientific knowledge as is available on this vague subject.

The author, who is head of the Research Department of the Bleachers' Association, Ltd., states that his book is not meant for those who have no other books on bleaching, but rather as a supplement to other published works. The title of the work, he says, might be more accurately given as "Cellulose: Bleaching."

The headings of certain of the chapters may give an idea of the many phases of the subject which Mr. Higgins has treated and on which he quotes other authors: Elimination of the Non-Cellulose Constituents in the Bleaching Process; Elimination of the Waxes; Elimination of the Proteins; Elimination of the Mineral and Pectic Matters; Destruction of the Coloring Matter by Oxidizing Agents; Hypochlorites Produced by Electrolysis; Cellulose and Water; Cellulose and Oxidizing Agents; Cellulose—the Bleached Product; Bleaching Processes; Bleaching Faults.

The book should prove to be a valuable contribution to the literature on bleaching.

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

J. M. W.—*Question:* Is it possible to obtain dyes that will simply impart a light tint to silk and cotton, say, from a weak soap bath, but which can be entirely washed out by hot water?

*Answer:* There are many dyes of this sort. In fact, many firms are selling dyes for this purpose to silk throwsters who have to tint the various lots of silk they handle so as to distinguish lots, certain twists and qualities, and avoid confusion. The same dyes are sold for domestic use (much weaker, however), so that it is possible for a woman to buy a white blouse and then tint it a different shade every time it is washed. In tinting, the dye does not actually dye the fiber, as in true dyeing, but there is a slight affinity for the color, which may be applied evenly, and even rinsed in cold water; but the affinity of the dye is so slight that a little soap and hot water strips it entirely. We cannot, in fairness to our advertisers, give you a list of the dyes you might use, but refer you to them for further details.

M. C.—*Question:* In boiling off half-silk hosiery I find that I cannot get rid of all the oil, gum and tint in one soap boil, but do not want to increase my expense for soap, as I am using 25 per cent now. Do you advise the use of soda or even stronger alkali, or would it hurt the goods?

*Answer:* You are using enough soap, providing you are not boiling off in too short a liquor; but to improve matters and not increase your soap bill, without using soda, which is not advisable, you need only save an old soap bath and run the goods twenty minutes in it to remove most of the oil, gum and tint. Then run in a fresh bath twenty minutes and the stockings will be ready to dye. Save this second liquor for the first bath of the next lot and you will improve your work without increasing your amount of soap.

V. C.—*Question:* What class of dyestuffs are best suited for the production of fancy shades on wool to stand fulling?

*Answer:* The answer obviously is the mordant dyes

fixed by chrome; but the question then arises, What process? There are a few azo dyes and the derivatives of Gallocyanine, which give fast dyeings on a chrome mordant; but dyers object to this process for several reasons, viz.: the time required, the lack of complete penetration, the effect of long working and boiling on the wool, and the harshness often obtained. The next method is by after-chroming or top-chroming certain acid dye-stuffs. This method gives a greater variety of brilliant shades and allows the admixture of acid dyes like Wool Green S, Patent Blue A, Acid Violet and others which, while not properly mordant dyes, are made fast by the operation. The objections to this process are that many dyes, especially those containing chromotropic acid, are greatly changed in shade by the chroming, and make the matching of shades difficult; also, that there is always some free chromic acid left on the dyed fiber, and this may cause changes in shade during steaming and other finishing processes, or may alter adjacent colors in the finished fabric.

The third method is the monochrome or chromate or any other single-bath chrome process where free bichromate is added together with the dye, and where acid is added either by the dyer or set free by the decomposition of an ammonium salt during the boiling.

The one-bath process is best suited for the lighter shades and for pieces with silk effects. It has the advantage of making the matching of shades a more simple matter, and is adapted for use in special types of dyeing machines for slubbing, jacks-pools, etc. Some claim that the one-bath process gives shades faster to fulling than after-chroming, but our personal opinion is that the one-bath method should be used for the lighter shades and the after-chrome process for heavy shades.

On this subject, as with all other practical dyeing questions, you will find advocates of each process who are equally positive that their way is the only one to be considered.

**E. F. S.—Question:** Have basic dyes any practical use in the dyeing of wool?

**Answer:** There are quite a number of mills, particularly those making fancy blankets, that dye loose wool with such dyes as Methylene Blue, Victoria Blue, Methyl Violet, Rhodamine Fuchsine, Safranin and Chrysoidine. The reason is because the dyes are brilliant, very strong, stand light fulling and particularly sulphur bleach. Occasionally we see plaid cloakings with the reverse side in blue, purple or some other solid shade. In this case there is no exposure to light and the basic dyes have been found adequate. However, we feel that, except for goods that are not to be subjected to any amount of wear or exposure, good wool is at least worthy of good dyes. So long as the manufacturer of the fabrics continues the use of any class of dyes he, of course, creates a demand which will naturally be supplied by the dealer, but it is just this sort of dyeing which has given the opponents of American dyestuffs a good opportunity to criticise.

## Recent Patents

### Knitting Machine Construction

(1,398,865; November 29, 1921)

WALTER LARKIN (assignor to Fidelity Machine & Manufacturing Company, Philadelphia, Pa.)

Claim is made for the combination in a circular knitting machine of a main supporting frame; a needle cylinder; an adapter ring removably connecting the frame and the cylinder; and a cam ring rotatably mounted on the adapter ring.

### Stop Motion for Knitting Machines

(1,398,694; November 29, 1921)

EDSON S. HINELINE (assignor to Hineline Engineering Company, Providence, R. I.)

Patentee describes the combination with the needles of a knitting machine adapted for both rotary and reciprocating knitting, and a member mounted to slide toward and from the needles, and having functioning relation with respect to the normal path of the needles during rotary knitting, whereby it may cause functioning of an emergency device, but having non-functioning relation with respect thereto during reciprocating knitting.

### Machine for Treating Cotton

(1,394,775; October 25, 1921)

JAMES FRANKLIN LEVERING (assignor to Standard Cotton Company of America, Delaware)

This is a machine for treating cotton comprising in combination a supporting frame and movable devices supported thereby adapted to operate upon the cotton, comprising agitators adapted to break the hull of the cotton boll and transfer the same onward into the apparatus, a rotating drum provided with fingers adapted to receive same and carry same onward, a knife adapted to scrape the fragments of hull and trash from the cotton as the same is carried onward by said rotating drum, rotating fingers adapted to take up said trash, a traveling apron adapted to receive said trash and convey the same out of the apparatus, a doffer brush adapted to remove said cotton from said rotating drum, a second knife adapted to remove from said rotating drum any trash which may not have been removed by said first-named knife, means adapted to convey said cotton out of the apparatus, and means adapted to operate said movable parts.

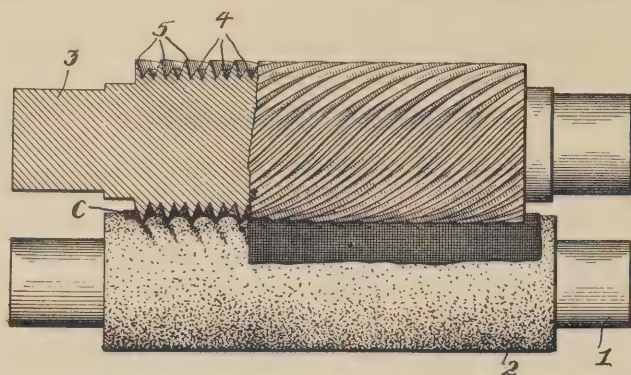
### Cloth Finishing

(1,401,663; December 27, 1921)

GUSTAV WOLF

Claim is made, in a cloth-finishing device, for a lower roll having a felt covering, and an upper roll having





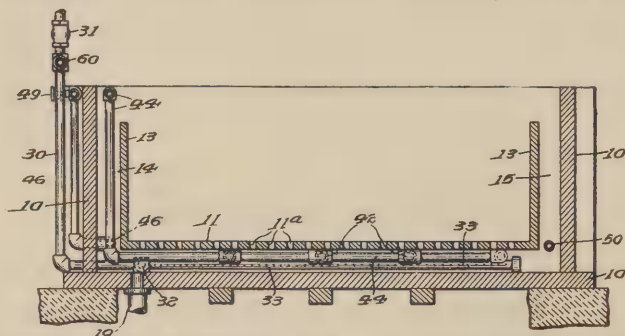
metallic teeth of spiral form and arranged to be of alternating depths, whereby to provide a three-point contact with the cloth.

### Process of Dyeing Yarns and the Like

(1,400,675; December 20, 1921)

JAMES A. GRUNDY (assignor to John Bromley & Sons, Inc., Philadelphia, Pa.)

The process of dyeing yarns and the like which consists in supporting them in a suitable container of dyeing liquor which has been previously heated to a temperature of approximately 212 deg. Fahr., and then effecting simultaneously a uniform density of the dye



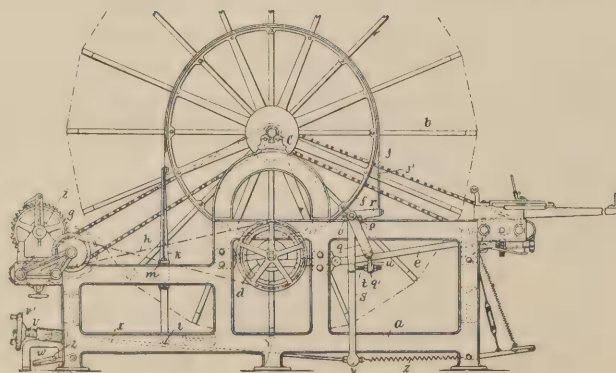
liquor and a discharge of the same in the region of the suspended yarns, by utilization of the expansive and propulsive forces of compressed air at a minimum pressure of approximately 20 pounds to the square inch above normal or atmospheric pressure, delivered within the body of dye liquor by means of suitably arranged piping.

### Warping and Beaming Machine

(1,401,655; December 27, 1921)

GRANT SIPP

In a machine of the class described having a rotary



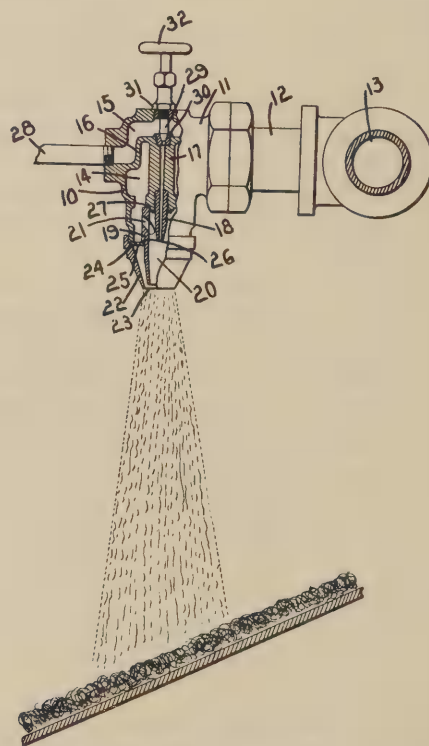
member whose rotation is to be resisted, the combination of a supporting structure and mechanism therein to resist rotation of said member, including a brake device to frictionally contact with said member and means to resist movement of said device with said member due to friction between them, including a flexible elastic lever structure; said supporting structure having means to support said member with its axis parallel with the fulcrum of said lever structure.

### Fiber Conditioning Process and Apparatus

(1,401,376; December 27, 1921)

ALBERT W. THOMPSON (assignor, by mesne assignments, to Parks-Cramer Company, Boston, Mass.)

Patentee describes the process of moistening textile fibers which consists in forcibly projecting globules of a moistening liquid into a moving mass of textile fibers by means of a whirling jet of gaseous fluid, said jet being surrounded by an envelop of gaseous fluid



also projected under pressure whereby the envelop of gaseous fluid will agitate said fibers and will concentrate the fluid carrying jet and cause the same to penetrate deeply into the mass, the quantity of fluid and the quality of globules being correlated to the character of the material treated.

### Preparation of Knitted Fabrics for Use

(1,401,501; December 27, 1921)

CHARLES E. SHAW

Recites a method of preparing tubular knitted fabrics for handling comprising reinforcing a longitudinal zone thereof by means positioning the threads in the zone against relative movement and longitudinally slitting the fabric along said zone.

representing qualitative relations of colors to each other, comprising a structure and spots thereon repre-



senting color; those of said spots whose colors differ in luminosity being arranged at directions and distances from each other which when projected upon a scale of luminosity are directly proportional to the differences in quantity of ingredient white in the grays respectively equaling them in luminosity.

The art of color synthesis from a plurality of ingredients differing in hue from the color which is to be made, comprising the associating and spinning of said ingredients together, with a space left between them wherein is a vista from which approximately no light reaches the eye, whereby ingredients having a higher luminosity and diverse hue may be used in a desired synthetic color of lower luminosity.

A multicolor iconograph comprising a body having a surface with spots representing different hues arranged around a neutral axis at angular distances apart according to the differences of value length of their respective hues.

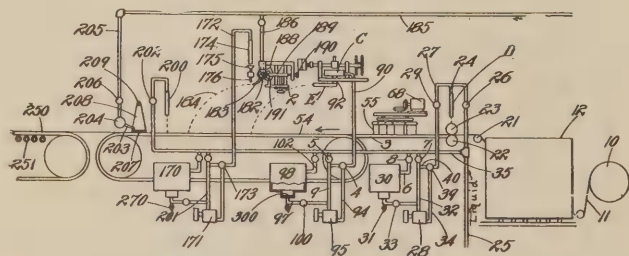
Apparatus to determine the synthetic proportions of three or more working colors to be mixed to make a desired color; said working colors being of differing luminosity, of great strength, and of hues widely separated from each other; comprising in combination said working colors and a chart having fixed upon it spots indicating by their respective positions the hues and strengths and indicia associated therewith indicating the luminosities of said working colors relative to each other according to scales of color qualities; whereby ingredients of any required one of a multiplicity of other colors are computable from the chart by measure and by application of mathematical laws, and said required color is producible from said working colors by mixing them or some of them together as ingredients in proportions thus computed.

#### Coloring Machine

(1,401,504; December 27, 1921)

RUDOLPH SYKORA

Various claims describe respectively: An apparatus for applying liquid coloring matter to a web of sheet material, having means for applying liquid to the surface of the web, and having a series of brushes which



move in sequence transversely over the surface of the web from one side of the web to the other and back, and means for moving each brush in such manner that it moves entirely off the web at each side before it begins its return movement.

An apparatus for applying liquid to the surface of a web of sheet material, having a traveling carrier which supports and carries the web, means for applying liquid to the web, mechanism which clamps the web to the carrier on which it is supported and carried, said clamping mechanism being movable with the carrier and being laterally extensible, the extensibility being controlled by the expansion and contraction of the web.

Means for distributing liquid upon sheet material comprising a drum having a diaphragm top, a liquid supply pipe leading into the drum, an outlet pipe, and means for automatically delivering a continued series of blows upon the diaphragm.

A machine for producing water-color surface on sheet material having a series of funnels, means for discharging liquid into the funnels, and a mount for each of said funnels comprising a pair of parallel rods having a series of curved recesses therein, the recesses in one of said rods co-operating with the recesses in the other rod to form a series of spherical pockets, a ball mounted in each of said pockets, and means for clamping each of said rods together so as to hold said balls in the pockets, each of said balls being formed with a perforation through which the stem of one of said funnels extends, said funnels being adjustable to varying angles by loosening the bolts, turning the balls and again setting up the bolts.

A machine for producing water-color surface on sheet material, having means for depositing liquid upon the surface of the sheet, an air blast, and a deflector by which the air blast is deflected to spread the depositing liquid on the sheet.

#### Manufacture of Paranitroaniline from Paranitroacetanilid

(1,400,555; December 27, 1921)

KAICHI KASAI (assignor to Mitsui Mining Company, Tokyo, Japan)

Patentee describes the process of manufacturing paranitraniline characterized by subjecting to pressure a mixture of paranitracetanilid and an aqueous alkaline solution, while heating the said mixture to a temperature between 120 and 130 deg. Cent., substantially as described.

#### Salvage Trimmer for Looms

(1,400,711; December 20, 1921)

HARRY T. ABBOTT (assignor to Draper Corporation, Hopedale, Mass.)

This comprises a loom comprising a frame, cutting mechanism supported from the frame with its field of action beneath the selvage of the cloth and forward of the fell and operating in a plane at an angle to the vertical and means for operating said cutting mechanism from a moving part of the loom whereby filling ends depending from the selvage are severed.

TEXTILES

PAPER

LEATHER

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

JANUARY 30, 1922

NUMBER 3

## FEATURES OF THIS ISSUE

In "The Control of Dyestuff Stocks," the chemist of a large textile plant tells how one laboratory made an easy routine of this work, and submits forms used for checking up.

"Impurities in Water Which Affect Dyeing," by T. Hadfield, gives a number of simple qualitative tests for suitability and discusses the elimination of iron.

Proceedings of the A. A. T. C. C. include reports of the third Council Meeting, the formation of the New York Section, the second Research Committee Meeting and the conclusion of Chase's paper on "Mercerization."

In a discussion of the international dye situation, Sir William Alexander declares manufacturers, consumers, chemists, labor and government must join hands if Germany's policies are to be met.

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FIG. 1—Sample Balance Card





The appliance by which these pastes are applied to the cloth consists of a sort of padding machine, provided with a trough through which the fabric passes, from which the cloth is led over scrapers or "doctors" and finally dried. Heavy shades may pass through the "pad" two or more times in order to insure good im-

pregnation of the cloth, and hence opacity.

After being impregnated, the cloth is read to be coated, which may be done by means of a special linseed-oil composition or dressing; or with caseine; or with one of the nitro-cotton varnishes soluble in amyl acetate or acetone.—"Canadian Dyer & Color User."

## Impurities in Water Which Affect Dyeing

Matters in Solution and Suspension Concern Dyer—Former More Difficult to Deal With—Some Simple Qualitative Tests—Effects of Hardness and Removal of Same—Presence of Iron

By T. HADFIELD

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THE solvent power of water is so considerable that all kinds of water contain a varied amount of mineral, vegetable, animal and gaseous matters in suspension and in solution the nature of which varies according to the subsoil and the impervious stratum of the districts through which the water drains. Water draining from moorland will contain iron and vegetable matter, while water passing over rocks, as limestone and granite, will contain magnesium and lime. Apart from the "softening" or "hardening" ingredients there is in most waters a varied amount of organic matter (vegetable and animal) in suspension and solution.

### SIMPLE QUALITATIVE TESTS FOR SUITABILITY

The natural impurities which concern the dyer are the matters in suspension and solution. Those in solution are the most important, as matters in suspension are readily removed by filtration. The matters in solution are more injurious, and much more difficult to remove, as it involves the employment of chemical and mechanical methods. In many cases a qualitative examination of a specimen of water will afford sufficient criterion of its suitability for industrial purposes. The following simple tests will be found useful:

**Hardness.**—To a small quantity of water in a large test tube add a little of Clark's "Soap-test," and shake, when the degree of turbidity produced will afford a rough indication of the degree of hardness.

**Chlorides.**—Acidify a little of the water with nitric acid, and add a few drops of silver-nitrate solution. Four grains of sodium chloride per gallon gives a slight turbidity, ten grains a slight precipitate, and twenty grains a considerable precipitate.

**Organic Matter.**—Add to a few ounces of the water sufficient dilute solution of potassium permanganate to produce a faint pink color. The solution will grad-

ually become decolorized, the rapidity depending on the amounts and characters of the organic matter present.

**Sulphates.**—Acidify a little of the water with hydrochloric acid, and add a few drops of barium-chloride solution. A white turbidity will be produced, varying in amount with the quantity of sulphates present.

**Free Ammonia.**—Add to a sample of the water a few drops of Nessler test, and note degree of brown or yellowish coloration produced.

**Nitrates.**—Mix a little of the water with twice its bulk of pure sulphuric acid, then add a drop of a solution of pyrogallol acid. A pink-blue color, changing to brown, indicates nitrates.

**Nitrites.**—Acidify water with sulphuric acid, and add a little pure potassium iodide, followed by a little freshly prepared starch solution. A blue tint indicates the presence of nitrites.

**Lead or Copper.**—Acidify some of the water with hydrochloric acid, and add a little sulphuretted hydrogen water. Any brown coloration indicates lead or copper. Or the water may be stirred with a glass rod dipped in ammonium sulphide, and color noticed.

### TEMPORARY AND PERMANENT HARDNESS

Magnesium and lime, if present in water, have a very injurious influence, as they possess the property of precipitating soap solutions. In all operations where large quantities of soap are employed, the use of hard water entails a considerable loss. Therefore, the temporary and permanent hardness should be determined by means of Clark's method—1 c.c. of soap solution equals 1 deg. of hardness.

For all industrial purposes, and especially dyeing, bleaching and washing, all waters should be tested for "hardness," as many disadvantages occur, with loss of time and money. One great disadvantage is that the



precipitated earthy soaps are more or less of a sticky nature, and adhere so tenaciously to the cloth or fiber that they cannot be removed by ordinary processes. In the scouring of animal fibers, as wool and silk, they render the fiber more or less impermeable, so that neither the mordant nor the coloring matter can be afterwards properly fixed, and irregular development of the color results. In many cases the precipitated earthy soaps act as mordants and so cause endless trouble, as any lime soap precipitated in the fabric would attract coloring matter and thus produce a variety of stains.

#### HARD WATER IN THE DYE BATH

Many fabrics are "soaped" after dyeing, and if the water is hard the precipitated earthy soaps give a greenish color to the finished fabric, and in many cases the colors lack brilliancy and the value of the fabric is much reduced. If hard water is used in the dye bath the coloring matter is very imperfectly extracted, and insoluble compounds are produced with alkaline earths, which are precipitated and rendered inactive. Hard water acts injuriously upon dyes and mordants: in the first case by dulling the color and causing irregularly colored cloth; and in the case of mordants, by neutralizing and precipitating basic salts, thus making the mordant less effective.

Water containing bicarbonates of calcium and magnesium should not be used for dissolving coal-tar colors, as in many cases the color base is precipitated as a tarry mass and much of the coloring matter is wasted, and if fabrics are dyed with such solutions they are apt to be spotted. In order that no defects shall result from the use of hard water, it should be first treated by Clark's method, according to the degrees of hardness, with lime or soda, and the water afterwards passed through the permutit process, as the permutit could be adopted that would clear the water from all impurities. The permutit may be calcium, magnesium, manganese, etc. The manganous permutit has the property of removing small quantities of iron from solution and destroying bacteria and organisms present in water; so that any kind of permutit can be used according to the nature and requirements of the treated water.

#### PRESENCE OF IRON SHOULD BE GUARDED AGAINST

Iron is another impurity which may cause much mischief, and should be tested for by evaporating a little of the water, and if a reddish deposit is produced it should be treated with a little hydrochloric acid and heated with a little potassium chlorate. The solution is then diluted and cooled, and then a little potassium ferrocyanide is added, whereon a blue precipitate is deposited if iron is present.

Iron acts even more injuriously than calcium or magnesium precipitating soap solutions. In wool scouring, bleaching and dyeing operations, where al-

kaline carbonates are used, ferric oxide is precipitated on the cloth, which causes dull shades, and bleached cloth acquires a yellowish tinge that cannot be removed by ordinary methods, thus making the cloth unsalable. Water containing free acids, as ulmic and humic acids from peaty water, attack iron, and may indirectly cause much mischief, and especially in the dyeing operation. The water should be tested with blue litmus, and if found distinctly acid it should be neutralized with a little sodium carbonate.

Of the gases in solution, sulphuretted hydrogen is the most common, and is detected by a strip of filter paper saturated with acetate of lead being placed over a flask containing the suspected water, which has been previously acidified with a little acetic acid. The filter paper turns brown if sulphuretted hydrogen is present in the water. This gas forms sulphides with metal mordants, thus producing black and brown stains.—"Textile Manufacturer."

#### NOVEMBER DYE EXPORTS TOTALED HALF-MILLION

Domestic exports of dyes and dyestuffs in November totaled \$500,918 in value, according to figures of the U. S. Bureau of Foreign and Domestic Commerce. Forty-one foreign countries or localities shared in the receipt of these goods, the month's exports of aniline dyes being valued at \$374,244, of logwood extract at \$49,971, and of all other dyes and dyestuffs at \$78,703.

This trade by countries was as follows:

Countries	Aniline Dyes	Logwood Extract	All Other
Belgium .....	\$7,624	....	....
France .....	478	\$604	\$446
Germany .....	....	2,450	....
Italy .....	....	336	....
Netherlands .....	....	545	300
Norway .....	1,800	....	....
Spain .....	3,404	....	148
Sweden .....	....	....	5,642
Switzerland .....	....	....	19
England .....	....	3,106	3,400
Bermuda .....	....	....	14
British Honduras .....	....	....	23
Canada .....	62,977	12,971	49,094
Costa Rica .....	135	....	23
Guatemala .....	87	....	48
Honduras .....	....	....	98
Nicaragua .....	....	....	27
Mexico .....	8,289	....	2,848
Newfoundland and Lab- rador .....	1,944	....	59
Jamaica .....	170	....	....
Cuba .....	2,247	....	302
Haiti .....	....	....	28
Dominican Republic ..	....	....	10
Argentina .....	7,315	200	450
Brazil .....	1,847	1,976	....

Countries	Aniline Dyes	Logwood Extract	All Other	Countries	Aniline Dyes	Logwood Extract	All Other
Chile .....	257	....	....	Japan .....	227,681	27,135	10,401
Colombia .....	116	174	1,831	Palestine and Syria....	926	....	....
Ecuador .....	3,196	....	....	Australia .....	24,920	390	....
Peru .....	174	84	488	New Zealand .. .....	....	....	705
Uruguay .....	....	....	117	French Oceania .....	11	....	....
Venezuela .....	2,911	....	144	Philippine Islands .....	1,470	....	....
China .....	29	....	....	British South Africa...	5,233	....	279
British India .....	6,959	....	1,756	French Africa .....	344	....	....

## Things Every Textile Chemist and Colorist Should Know

[Note—Under this heading will be introduced as a more or less regular feature the discussion of various fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.]

### No. 2

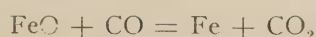
## Two Types of Bleaching: Oxidation and Reduction

IN the field of chemical action we have two very important processes, namely: oxidation and reduction.

In general, oxidation is a reaction brought about through the action of the element oxygen which usually consists in the direct chemical addition of that element to some other element or compound. As a result there is usually formed a compound containing a higher percentage of oxygen than the substance which has been oxidized, but in some instances the oxidation of a substance brings about complete decomposition with the formation of a number of simpler compounds.

Reduction, on the other hand, is a reaction which involves the removal of oxygen from some substance, and usually results in a pronounced change in its chemical constitution and properties. Many dyestuffs, for instance, are converted into colorless or entirely different colored compounds upon reduction.

While the terms oxidation and reduction are intended to indicate quite different results, as actual processes they are oftentimes inseparable, and one specific chemical reaction may involve both. Thus, when carbon monoxide is passed over ferrous oxide which has been heated to a high temperature, metallic iron and carbon dioxide are formed according to the following equation:

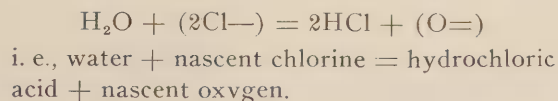


This reaction is fundamentally one of reduction, the iron oxide being reduced to metallic iron; but, on the other hand, it may be said that the carbon monoxide has been oxidized to carbon dioxide.

All of the practical processes of bleaching involve either oxidation or reduction. Oxidation methods are the most extensively used, being applicable to both vegetable and animal fibers. Reduction methods, while very effective for the bleaching of animal fibers, are of little if any use in the bleaching of vegetable fibers.

In the bleaching of cotton, dependence has always been placed upon the oxidation method, although the oxidizing action has been brought about indirectly through the use of chlorine or certain unstable chlorine compounds like the hypochlorites, which readily liberate chlorine under certain conditions.

It should be remembered that it is only nascent oxygen—that is, oxygen in the atomic condition with free bonds of valance—that is effective in bleaching. In other words, molecular oxygen, which is present in the air, represented as  $\text{O}_2$  or  $\text{O}=\text{O}$ , has practically no bleaching action, but oxygen in the atomic condition, expressed as  $\text{O}=\text{}$ , is extremely active as a bleaching agent. Atomic chlorine, known as nascent chlorine, quite readily reacts with water according to the following reaction:



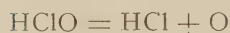
The nascent oxygen thus liberated is the active bleaching agent when chlorine is used.

The following experiment with chlorine and colored cotton cloth, so frequently performed by students of elementary chemistry, quite vividly demonstrates one reason for believing that it is the nascent oxygen and not the chlorine that brings about the bleaching: In one jar of dry chlorine gas place a strip of dry cotton cloth dyed with almost any basic or direct cotton color.



In another jar of the same chlorine place a similar strip of dyed cotton which has been moistened with water. While the latter is decolorized very rapidly, the former may not show any change for a number of hours.

The hypochlorous acid which is liberated from bleaching powder readily decomposes as follows:



i. e., hypochlorous acid = hydrochloric acid + nascent oxygen.

Numerous other reactions take place during the bleaching of cotton with chlorine compounds, but the belief generally accepted to-day by textile chemists is that the nascent oxygen liberated is the most effective bleaching agent.

If this is true, one would naturally expect nascent or atomic oxygen from other sources to bleach cotton, and such seems to be the case. Another simple source of nascent oxygen is the decomposition of peroxides, thus:



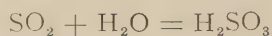
i. e., hydrogen peroxide = water + nascent oxygen.

Peroxide solutions prepared directly from hydrogen peroxide, and indirectly from other peroxides—particularly sodium peroxide,  $\text{Na}_2\text{C}_2$ —prove to be very effective for the bleaching of cotton. Other typical oxidizing agents like sodium perborate and potassium permanganate also readily bleach cotton.

In the early days of the industry all attempts to bleach wool by the use of the hypochlorites demonstrated the hopelessness of any satisfactory methods from this source. Instead of bleaching wool it turned it to a decided yellow color.

It was discovered that gaseous sulphur dioxide quite readily bleached wool, particularly if exposed in a moist condition to the action of this gas.

The sulphur dioxide reacts with the water, forming sulphurous acid according to the following reaction:



i. e., sulphur dioxide + water = sulphurous acid.

Sulphurous acid is a recognized reducing agent, extracting oxygen from many substances according to the following reaction:



i. e., sulphurous acid + oxygen = sulphuric acid.

The coloring matters naturally present in wool are of such a character as to be decolorized, but not destroyed, by the action of reducing agents. This has been demonstrated by the use of other reducing agents,

such as the hydrosulphites, but upon exposure to air the original color is quite likely to return slowly.

As a result of the simple, cheap and, for the most part, effective bleaching action of sulphurous acid upon both wool and silk, this reagent was used with these fibers exclusively for many years; and, in fact, this practice is extensively continued at the present time.

When it was rather definitely settled that it was nascent oxygen rather than chlorine that bleached cotton, textile chemists naturally tried other oxidizing agents on wool, with the result that hydrogen peroxide was found to bleach wool quite effectively without any of the detrimental effects of chlorine. As a result the peroxides have become extensively used in wool and silk bleaching in recent years.

It would therefore appear that the natural coloring matters of wool are of such a character as to be quite readily decolorized by either a reducing or an oxidizing process. It is also evident that with the oxidation bleach there is a more permanent change in these coloring matters than in the case of reduction. This, however, may be due to the fact that exposure to the air after bleaching is, if anything, a continuation of the oxidation process, while this same exposure after a reduction bleach amounts to a reversal of that process.

As compared with the processes using chlorine, the peroxide process has been found to be too expensive for the bleaching of cotton material on the large scale. As a result it is used only in the case of straight cotton material for the bleaching of hosiery, special fabrics, and sometimes in laundries.

One very valuable use, however, is made of the peroxide bleach. Union fabrics composed of cotton combined with wool or silk, or both, could not be bleached with chlorine in any form; for while this would be effective with the cotton, it would not only fail to bleach the wool and silk, but would, on the contrary, turn them a more pronounced yellow. On the other hand, the reduction bleach with sulphurous acid would be effective as far as the wool and silk were concerned, but would have no effect upon the cotton. In the peroxide bleach, however, we have a process which works reasonably well with both fibers under a similar treatment, and for this purpose the peroxides have found an extensive use.

---

The Peerless Hosiery Dyeing Company, which recently completed its new plant at Pleasantville, N. J., has started operations. Harry E. Brewin is president and treasurer and E. K. Biggard is secretary and general manager. Both were formerly with the Peerless Silk Dyeing Company, of Philadelphia, Pa.

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The Erlanger Underwear Manufacturing Company, Baltimore, Md., has started construction work on a one-story plant at Crisfield, Md., to be 10 by 120 feet, and estimated to cost about \$25,000.

# The German Vegetable Fiber Industry

Remarkable Results Accomplished in Use of China-Grass, Australian Seaweed and Jute in Place of Woolens and Worsteds

THE attention of textile manufacturers has been attracted to the remarkable results that are being attained in Germany in the manufacture of yarn from grasses, plants, leaves, etc. This new German industry is centered in the plant of the Deutsche Faserstoff-Gesellschaft (German Fiber Material Company), situated at Fuerstenberg, in Mecklenburg.

According to a report by the representative in Germany of the United States Department of Commerce, this plant was established in 1912. During the first year in which it was in operation it confined its activities to the manufacture and sale of the fibers. In 1913 spinning machinery was set up, and since then the spinning has been continued on an ever-increasing scale. The fibers dealt with include china-grass, Australian seaweed, jute, old jute rags and shoddy worsted yarn. In addition, a number of other fibers were worked up during the war. Some were abandoned afterwards, as the supply to be found in Germany was not sufficient to warrant their permanent use. Among these fibers are nettle, hops, willow bark, pine needles, cornstalks, ginster and asparagus. With the fiber taken out of pine needles and cornstalks, a very strong and tough paper can be produced.

Prior to the outbreak of war, the Deutsche Faserstoff-Gesellschaft was able to secure sufficient supplies of china-grass, Australian seaweed and jute, and it focussed its efforts on these fibers. During the war the imports of this raw material were cut off, and had not at the date of the report been resumed. Since the close of the war this concern has confined itself mainly to the manufacture of yarn from old jute rags.

## SOLIDONIA FIBER RESEMBLES WOOL

The vegetable fiber derived from china-grass is known as solidonia, and is similar to ramie. The Deutsche Faserstoff-Gesellschaft, by means of a special process, produces a long, fine, soft and curly fiber. The curliness of the solidonia fiber presents a special feature. The fiber looks very much like wool, and mixes readily with that product, thus opening a wide field for its use in the woolen industry.

In Germany, solidonia gained a wide field of use on account of the shortage of wool during the war. As a substitute for linen, solidonia has been used in Germany for the manufacture of table linen of beauty and strength. It has also been used for machine belting. German hosiery and underwear mills have produced from it socks and stockings which are difficult to tear,

unshrinkable underwear, and sporting jackets of fine quality and strength.

## VARIOUS USES

The German woolen mills have manufactured an army cloth which, composed of 75 per cent wool and 25 per cent solidonia, it is asserted, surpasses in tensile strength any pure-wool cloth. Similar results are claimed with respect to paper-makers' felts, which, with a percentage of solidonia mixture, show a considerable increase in strength. Furthermore, women's and men's clothing composed of half solidonia and half wool or shoddy, especially in piece-dyed goods, have found a ready market. In textile circles in Germany it is declared that there is an unlimited field for the use of this fiber. Previous to the war the price of solidonia in Germany was two-thirds the cost of good staple wool. No post-war comparison can be given, as none of this raw material is being imported into Germany. In 1914 solidonia in the carded stage found a ready market at 30 cents a pound, delivered in New York or Boston.

## POSITONIA DECLARED EQUAL TO MEDIUM STAPLE WOOL

Another fiber from which the Deutsche Faserstoff-Gesellschaft has obtained splendid results is the fiber known as posidonia. This is also a vegetable fiber. It is derived from seaweed, which is dredged in Australia and cleansed and washed in sweet water. Brought to Germany, the fiber is subjected by this concern to a chemical treatment for the purpose of softening it and making it resilient, the original fiber being stiff, harsh and brittle. The staple of this fiber is declared to be equal to a medium staple wool, and it is spun on the worsted and woolen system. It is characterized by elasticity and springiness, and the cloth which is made out of pure posidonia appears to show scarcely any creases. German cloth mills have mixed posidonia with wool or shoddy, and cloth of good strength and appearance has been obtained. It is believed that this fiber, by reason of its springiness, will have a wide field of use in the carpet industry. This raw material was sold at half the price of shoddy before the war; since the war none of this has been imported into Germany.

## USE OF JUTE FOR WORSTED YARNS

Some unusual results have been obtained with jute



by the same company. By a special process of chemical treatment a long, fine and beautiful fiber is being produced therefrom, a fiber which can readily be spun on the worsted system, pure or mixed with wool. Shoddy made from old jute rags can also be spun on the worsted or woolen system. Serges made from old jute rags or cloth made from half wool and half jute, wool or piece dyed, are used for women's costumes, overcoating, etc. Furthermore, sweaters and vests are being made from all-jute worsted yarn, and it has been difficult to recognize them as being made of such. The Deutsche Faserstoff-Gesellschaft claims that jute rep-

resents the cheapest fiber suitable for worsted yarn that has been discovered.

The Deutsche Faserstoff-Gesellschaft has, moreover, succeeded, by a special opening process, in manufacturing shoddy of sufficiently long staple to spin a high-grade worsted yarn from it.

This plant began work with a total of fifteen employees. Its personnel now numbers over 250. The buildings have been enlarged and new ones erected, and plans are on foot to make still greater additions.—“Journal of the Royal Society of Arts.”

## A Historical Survey of Dyeing

Experience Teaches that Dyers Must Work Hand in Hand with Science—More Progress Made in Past Sixty-five Years than in Preceding Thousands, When Dyeing Secrets Were Guarded—  
Next Half-Century Should Produce as Much Again

*[From a paper read before the Halifax Branch of the Foremen Dyers' Guild, owners of the copyright.]*

By C. E. BARRACLOUGH

IT is a remarkable fact that there is not a textbook treating of dyeing published in recent years which makes any mention of the history of the subject. I hope, therefore, that this paper will prove at least interesting, because of its novelty, and at the same time instructive. I think it is sometimes an advantage to look backwards and obtain in that way a change of view upon many subjects and at the same time a broader and better understanding of our art.

### INSTINCT FOR COLOR

I do not intend to give references to the various old authorities, but will content myself with saying that as far as possible I have only used those statements which have from time to time been accepted as facts. The art of dyeing no doubt originated in that love of distinction and personal adornment inherent in the human being, inducing man, for its gratification, to stain first his skin and then his dress with the gaudy colors of the vegetable kingdom. It has struck me, during the large volume of reading that I have been through in the preparation of this paper, that the first and earliest dyestuffs were derived from the vegetable kingdom, and it is not unreasonable to surmise that this is so because of the fact that it is in the vegetable kingdom that nature makes her most vivid display of color, and that man, in his desire to reproduce these colors for his own adornment, made the earliest discoveries in the art of dyeing.

The earliest historical records speak of colored garments being worn as marks of distinction for offices, both

political and religious, and also as marks of favor. Jacob gave his favorite son Joseph a coat of many colors, and Moses speaks of a raiment dyed blue, and purple and scarlet, and of sheepskin dyed red; circumstances which indicate no small degree of tinctorial skill. Moses commanded purple for the robes of the high priests and for the works of the Tabernacle.

### DYEING IN EGYPT

From modern research into the early life of Egypt it is quite clear that the ancient Egyptians had quite a remarkable knowledge of dyeing, being acquainted with the production of dyes on mordants, and also with the application of indigo.

Of course, these facts have been arrived at by the examination of mummy cloths of various periods. It is highly probable, however, that the art of dyeing is very much more ancient than even the ancient civilization of Egypt, and most probably dates back to the first Eastern civilized races of China and Hindustan. The earliest really historical mention of dyeing of any note is, however, in connection with the famous Tyrian purple.

Tyre, the capital of Phœnicia, was in those remote days a Manchester of antiquity, and became famous for the dyeing of this beautiful and permanent purple about 1500 B. C.

This purple must have met with a very early and general appreciation and rapid commercial success because we find that, nine years after the above date, the children of Israel, an enslaved people, on their leaving Egypt had

in their possession large quantities of this dye. In later years this dye was always named amongst the spoils of war.

That it was the dress of royalty at a very early period is indicated by the mention among the spoils of the Midians collected by the Israelites of the purple garments worn by their kings.

Pliny says, "The Tyrians first dyed their wool in the liquor of the purpura and afterwards in that of buccinum; the purple mentioned in Exodus, chapter xxv, was also twice dyed. Wool which had this double Tyrian dye was so costly that in the reign of Augustus each pound of it sold for 1,000 Roman denarii (about £36 sterling). But, lest this should not sufficiently exclude the use of it from all who were not invested with the highest dignities, laws were made inflicting severe penalties, and even that of death, under the later emperors, upon all who might unlawfully presume to wear it.

Thus the art of dyeing this color came to be practised by a very few whom the emperors maintained for that purpose; and it being interrupted by wars about the beginning of the twelfth century, all knowledge of it was soon after lost except what remained in the older writings, and during several ages this celebrated dye was considered and lamented as an irrecoverable loss. Of course, it will be known to all that this dye was made from a small shell-fish (a mollusc) and that it has now been identified as being a Brom-Indigo.

The earliest important event in the history of dyeing was the discovery of the effects of bases as mordants, and particularly that of alum in the fixing of adjective coloring matters.

#### HINDU ORIGIN

When or where this discovery was first made cannot be ascertained, but there is, however, good reason to think that the Egyptians borrowed this art from Hindustan, where it has existed for more than 2,000 years, probably with very little variation or improvement during that long period of time; and if we are to judge by the means formerly employed in Hindustan for dyeing or staining calicoes by those which were found to be in use when the Europeans first went there by the Cape of Good Hope, we may safely conclude that solutions of alum and of iron must have been the mordants employed for fixing their dyes.

The very early use of alum by the Egyptians and Hindustani is probably accounted for by the fact that in some parts of Egypt and Hindustan a natural crystalline form of alum is found to exist, and it probably was in this form that its good effects in dyeing had first been observed before man was led to the means and operations since employed for separating it from the various aluminous ores.

No records are available regarding the operations carried out and the processes invented by the ancient Romans, but it is certain that they were acquainted with the use of such products as madder, woad, nutgalls, alkanet

root, and with the application of blue and green vitriol, alum and some salts of lead. According to Discorides and Pliny, indigo was known in Europe and, although scarce, was regularly imported from India, whence it derives its name. I shall have reason to refer to the use of indigo in England at a later stage of my paper.

It is really a wonderful thing to reflect upon that the natives of India knew how to render indigo soluble and to be able to use it as a dye although the Greeks and Romans, always considered much more advanced races, do not appear to have possessed this knowledge.

It is interesting to note that the first manufactory for alum in England was established in the reign of Elizabeth at Guisborough.

The Romans, however, do appear to have bestowed some care on the art of dyeing, and we have mentioned by Pliny the fact that the circus members in their games were distinguished by colors—four of these being green, orange, gray and white.

In Europe the progress of dyeing—as indeed all other arts—was for a long period stopped by the wars and invasions of those barbarous nations who came from the northeast of Europe, excepting in a small portion of Spain. This stoppage lasted throughout at least five centuries.

But for the establishment of this Saracen Colony in Spain it is very likely that the old art of dyeing would have been completely lost, but these so-called Saracens succeeded in establishing a settled state of society and, as their written records show, attained a high degree of perfection in such arts as paper making, sugar refining, and the extraction of dyes from native vegetable produce.

They were, doubtless, aware of the manner of producing Turkey red, as the means of producing that dye on tissues was known at the time at Adrianopolis in Turkey.

#### SLOW EUROPEAN PROGRESS

The art of dyeing did not revive in Europe until the beginning of the thirteenth century, and then so rapidly did its progress extend in some directions that towards the beginning of the fourteenth century there were no less than 400 dye houses in Florence.

About this time the Italians and Venetians also largely practised the art, and it is extremely likely that the Jews were the greatest dyers at this period, especially so in Florence.

The art of printing (*i. e.*, of manuscripts) proved for dyeing, as well as for other arts, its great propagator, and in 1429 the first collection of processes used in dyeing was printed and published at Venice under the name of "Mariogola del'Arte du Tuitori," of which another and much improved edition was printed in 1510.

From this book an individual named Giovanni Ventura Rosetti, who traveled Italy and the neighboring countries to learn the methods and means employed in dyeing, composed and published in 1548 a work under the title of "Pliithos Art of Dyeing." This book has always been considered to have contributed more to the improvement of the art than any other.



M. Berthollet pointed out that in this book there is no mention of either indigo or cochineal, and it is therefore assumed that these two dyestuffs were not known to the Italian dyers of the period, *i. e.*, 1548 and thereabouts.

#### THE ROYAL SOCIETY

In 1662 the Royal Society, upon its first institution, bestowed some attention to the subject of dyeing, and at the same time Sir Wm. Petty, one of its members, brought in a paper entitled "An Appendix to the History of the Common Practices of Dyeing," which seems to have been the first account published in the English language of the means and operations employed in the art of dyeing. Nearly two years afterwards Mr. Boyle presented to the Royal Society his "Experiments and Considerations Touching Colours," and shortly afterwards it was ordered by the Society "that the way of fixing colours should be recommended to Mr. Howard, Mr. Boyle and Dr. Merritt."

The work of these gentlemen did little to advance dyeing (the Mr. Boyle mentioned is the one who formulated the law in regard to gases, which to this day is known by his name).

Another member, Mr. Hooke by name, produced before the Society a piece of calico stained with yellow, red, green, blue and purple colors, which he said would endure washing with warm water and soap.

But from this time (1663) it does not appear that the learned scientific English did anything of note to advance the art of dyeing until a much more recent date.

Not so, however, in France. There, one of its ministers of State, viz., Colbert, anxious to extend the commerce and manufactures of that country, turned his attention particularly to the art of dyeing with a view to amend as well as to obviate frauds in dyeing. It was to this end that he had prepared in the year 1672 a book on the dyeing of wool.

This was afterwards embodied in an act which controlled dyers and divided them into two classes—those dyeing colors which were deemed "lasting" and those who were only allowed to dye "loose" colors.

Restraints of this kind must have operated to restrict progress had not the French Government offered large prizes and appointed eminent chemists—Dusay, Hellot and Berthollet—for the improvement of those arts allied to chemistry, especially the art of dyeing. This is, so far as I am able to find out, the first historical record of the alliance of chemistry and dyeing (1680), so that it is from this time that we note real progress.

The discovery of America and its opening to commercial enterprise formed an era in the history of the art of dyeing, as from that country were introduced a variety of new dyestuffs such as logwood, brazil wood, quercitron, cochineal, annatto, etc., which with the discovery of the use of tin compounds as mordants about the same time, gave the dyer a facility and power of producing shades of such a variety of tints and of such durability, depth

and luster, that it is now difficult to conceive possible to have been produced in former times.

#### INDIGO DENOUNCED

I have already mentioned that, according to Pliny, indigo was known in Europe but it was not known in England until the time of Elizabeth (1560), and then there was such a protest against its employment that it was denounced as a dangerous drug and forbidden to be used by Elizabeth's Parliament.

An act was passed authorizing searchers to burn both it and logwood in every dye house where they could be found. This act remained in force until the time of Charles II, *i. e.*, for nearly a century, such was the affection which they had for their native woad with which their native sires used to dye their skins in the old times.

From the end of the seventeenth century to the middle part of the eighteenth century there was no very marked advance in dyeing, but with the introduction of steam as a motive power and also as a means of heating the various dye liquors a great change came over the art and large firms—many still in existence—came into being. Watt made his improved steam engine in 1764. It is of interest to note here, in relation to the use of steam for heating, that a friend of mine has recently made a tour of dye houses in the West Country and found many firms, noted for their beautiful West of England cloths, still heating their vessels with the open fire.

The next important—very important—step in dyeing was the introduction of chrome salts as mordants and also as a means of producing colors—chrome green and chrome yellow and orange.

The introduction of manganese as manganese bronze also marked an epoch but, of course, this is now practically obsolete.

A great impetus was given to dyeing by the establishment during the last century of schools of dyeing, and those of Leeds, Crefeld, Mullhouse, Manchester and Bradford are well worthy of special mention.

The late Professor Hummel, of Leeds, was almost a pioneer in what I may call the scientific study of dyeing, and his lectures were attended by students from all parts of the world.

I have known when, besides the English students, there were in attendance at Leeds, Germans, French, Belgians, Dutch, Spanish, Italian, Japanese, Chinese and Malattas.

His work, published by the house of Cassell, "The Dyeing of Textile Fabrics," was for many years the standard book on dyeing, although the late Sir Wm. Crookes compiled a book on "Dyeing and Calico Printing," but this was very largely a collection of recipes and patterns.

Hummel's work on "Chroming" was and is to-day considered a classic in dyeing research, and it was to his work that we owe the explanation of defects due to overchroming and the correct and now generally adopted methods of applying bichrome to wool.

## NATURAL COLORS

It is of passing interest to note that the dyeing courses at Leeds and Bradford, even as late as twenty years ago, always covered the natural colors, many of which are now quite obsolete, and it was always a puzzle to me to know why we should study dye patterns with such things as madder, camwood, weld, quercitron, peachwood, barwood and lac dye.

Some of these I find in use even to-day, among them being peachwood, weld and lac dye; in fact, I have only recently sold two tons of lac dye.

The greatest impetus was given to the dyeing industry by the epoch-making work, or discovery, of Perkin.

Runge, in 1834, discovered a substance in coal tar to which he gave the name of Kyanol, because it produced a blue color with bleaching powder solution, but this reaction merely remained a scientific fact until Perkin, in 1856, for the first time succeeded in producing on a large scale a violet coloring matter, which he obtained by treating a solution of aniline with bichromate of potash. This coloring matter he termed mauve.

## RAPID PROGRESS

From this time progress in color making went on by leaps and bounds. We have in rapid succession quite a galaxy of colors; 1858 Hoffmann's violet, which, although produced only two years after Perkin's mauve, almost superseded it. At the same time he discovered and made magenta. In 1861 Girard made the phenyl violets and aniline blue; in 1862 Nicholson made the soluble blues, the so-called Nicholson blue. In 1862 also was made aldehyde green. In 1867 Paris or methyl violets were made and exhibited at the Paris Exhibition of that year.

I now come to the influence which the introduction of machinery had upon the art of dyeing. It has already been mentioned that Watt made his steam engine in 1764, but it was not for many years that the old hand cisterns for dyeing became gradually replaced, and then only by the simplest means.

It does not appear that anything worthy of the name of a dyeing machine was made until the Obermaier was introduced about 1887.

This machine introduced quite a new principle, viz., the circulation of the liquor whilst the material to be dyed remained stationary. The machine had a good reception and was the forerunner of all present-day machines of that class.

That other very well-known and much-respected machine, the Klauder-Weldon, was of somewhat later date, and the principle there is, as you all know, just the reverse.

The cop and beam dyeing machines, the various warp dyeing machines—all too numerous to mention—are all really milestones in the history of dyeing and have very largely been rendered possible by the introduction of synthetic dyes of a very soluble character.

After this rapid survey of the history of dyeing it is

only natural to ask oneself: What does it teach us? To me it seems to point very clearly to this—and I don't want to labor the point: An art such as yours must run in double harness, you must join hands with science. From the day of Perkin in 1856 to now is only sixty-five years, and yet the progress made in those years is more than all the progress of the thousand years when dyeing was a jealously guarded secret.

As dyers, you should be in ever constant touch with those in kindred occupations. The dyers' relations with the color makers, chemists, engineers and the manufacturers of the materials which he is called upon to dye should be of the closest possible, as it is by such association that problems will be solved and the new ideas and processes to work them out evolved.

## THE FUTURE

In conclusion, I want to take a peep into the future and speculate as to the most probable developments that are most likely to take place.

I hope to see before many more years the use of wood for dye vessels entirely superseded by a non-stainable and absolutely smooth material. I can already see steps—and marked steps—being taken in this direction.

Some will know the product to which I refer, but as I am not in any way wishing to advertise any maker's goods, I shall not mention the name.

I also hope that within a few years all wool goods will be made "moth proof." This problem has been attacked by the German color firms, and from samples and tests which I have seen and made I think that, except in a matter of cost, the problem can be considered solved.

There has been for some ten or twelve years now in Germany a crusade—under Dr. Krais, late chief chemist to the B. S. A.—for the use of only the fastest dyes, and the Germans are leaving no stone unturned to inculcate this idea into the various markets of the world.

It seems to me to be only a question of time before only the very best alizarine and acid chrome colors will be demanded as well as, of course, the vat colors.

The group of vat colors is being rapidly developed and I have private communications from some German color firms that within a comparatively short time a full range of shades of this type of color will be available for dyeing all shades on both animal and vegetable fibers. Another probability is the production of the actual colors on the fibers themselves.

## DEVELOPED DYES

A beginning was made by Professor Green's invention of the ingrain colors.

It led to the dyeing of fast shades on cotton by the diazotizing and developing processes leading to para red and similar colors.

Shortly before the war the introduction of Naphthol AS again brought this method to the foreground, and it



is quite likely that the time may soon come when any fast shade on cotton may be produced by this method. The introduction of pressure and vacuum dyeing machinery afterwards are other matters on which work has already been done.

In conclusion (again) I think that we shall see at least as much progress during the next fifty years as we have in the past fifty years, and societies like yours will no doubt contribute largely to such progress.—“Dyer and Calico Printer.”

# The Dyeing and Printing of Foulards

Types of Foulards—Strength of Boiling-Off Bath—Bleaching for Clear Tones—Colors Available for Printing  
—Method of Dyeing—Cold Discharges

**T**HIS particular class of silk fabrics and those most closely related to it in structure and design comprise a most important group of textiles which occupy a prominent position in the silk market, and which are constantly increasing in popularity. While other fabrics appear from time to time, and for the moment appeal to the popular taste, the fact remains that the silk foulards retain their own position, and the new aspirants gradually pass into oblivion.

Silk foulards are generally made according to two distinct methods, viz.: direct printing of suitable colors upon the fabrics, or by dyeing the fabrics first with some solid color, and then discharging white or colored patterns upon it. Resist or reserve effects are sometimes printed upon the white cloth, and afterwards the goods are dyed, certain effects being thereby obtained; but this latter method is not frequently used.

Direct printing for light, fancy, single or varicolored effects is the most common method and is one which allows a very broad field for the ability of the designers.

Before being printed, the fabric should be very thoroughly inspected in the gray, and all defects of weave, loose threads, knots, blebs, etc., removed; afterwards the pieces should be carefully singed and then boiled off.

## BOILING OFF

Boiling off of silk pieces requires the same care and attention to detail as that of silk skeins; only the softest water should be used, and the soap ought to be a pure olive-oil soap. If hard water is to be made use of, it should be treated with a sufficient quantity of soap, before putting in the pieces, to precipitate all lime and magnesia present, which can then be skimmed off. The pieces may be handled either in the rope form or over a winch; this latter is a very common method, and allows the fullest opportunities to observe the progress of the work. Fine texture fabrics may be wound on the spider wheels, which permit many yards to be handled on one wheel without any lap touching the previous one.

The strength of the boiling-off bath should be be-

tween 14 and 20 ounces of soap per 10 U. S. gallons, and the fabrics should be worked in this liquor at the boil for at least one hour. Some concerns use two soap baths, the first bath being a previously used bath and the second being a fresh soap bath, which when once used then becomes a first bath for the next set of pieces. When the pieces have been thoroughly freed from all traces of natural gum—all gum must be completely removed, especially if the goods are to be dyed solid colors; any that may remain will surely cause the fabrics to be unevenly dyed—they are then well washed in soft water containing about 20 grains of soda per gallon; this facilitates the removal of any trace of soap in the goods.

This is important, as it is well known that grease or fatty acids in silk will soon effect its destruction; therefore, for the best quality of mill output too much care cannot be given to insuring the complete removal of all soap from the pieces after they have been degummed. The presence of traces of soap or of lime (from hard water) is indicated in piece-dyed goods, for instance, by dark blue or deep brown, shady, clouded areas, etc., this being a sure indication that the washing has not been well done. It is unfortunate, however, that these defects cannot be located before dyeing.

## BLEACHING FOR CLEAR TONES

For very clear tones, and for certain styles, the pieces, before printing or dyeing, must be bleached. For this purpose hydrogen peroxide is most commonly used. The bleaching is carried out by laying the fabrics either in regular folds or in rope form in the bleach tank, covering them with a wooden lattice to confine the goods below the surface of the liquor. After bleaching, the goods are washed free from all bleaching agents and dried, when they are ready for dyeing or printing.

For ordinary figured effects on a white ground, the direct printing style is most commonly used. For this purpose colors of the Diamine or direct group are selected. These are capable of complete fixation by moderate steaming. When washed after steaming

(Continued on page 94.)

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

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Lowell Textile School, Lowell, Mass.

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## CORRESPONDENCE

In the Proceedings published in the January 16 number, under the head of "Correspondence," reference was made to the official reply to the letter received from the Secretary of the Society of Dyers & Colourists at the time of the inaugural meeting in Boston. The publication of this letter was inadvertently omitted and it now follows below:

November 28, 1921.

A. SILVERWOOD, HON. SEC.,  
SOCIETY OF DYERS & COLOURISTS,  
BRADFORD, ENGLAND:

Dear Sir—Your letter of October 25, 1921, was happily though unconsciously well timed. It was received on the morning of November 3, just a few minutes before I left Lowell to attend the inaugural meeting of the American Association of Textile Chemists and Colorists, which was to be held that afternoon in Boston.

It was a great pleasure to read your letter at our meeting, and as a result the following resolution was unanimously passed:

"The newly organized American Association of Textile Chemists and Colorists sends greetings to the Society of Dyers & Colourists, and assures them of its co-operation in every way."

Replying more directly to your inquiry, we will say that there is no doubt but what some scheme of co-operation is possible and we trust that it may develop

without too much delay. With this in mind, we would suggest that the British Society, from their thirty-seven years of valuable and successful experience, suggest for our consideration some of the ways in which they believe the newly organized American Association can best co-operate.

With cordial greeting to yourself and the Society which you have the honor to represent, I am,

Sincerely yours,

(Signed) LOUIS A. OLNEY, President.

## THIRD COUNCIL MEETING

The Third Meeting of the Council of the American Association of Textile Chemists and Colorists was held Friday, January 13, at the Engineers' Club, Boston, Mass.

The following members were in attendance:

Prof. L. A. Olney	William H. Cady
William K. Robbins	W. M. Scott
George A. Moran	Winthrop C. Durfee
A. E. Hirst	W. E. Hadley
James L. Amsden	

William D. Livermore was absent, owing to his attendance as the representative of the Association at the meeting of the Dye Advisory Committee of the Textile Alliance, Inc., which was being held in New York the same afternoon.

A letter had been received wherein information was requested as to the qualifications for membership in the American Association of Textile Chemists and Colorists. Two gentlemen were seeking membership who were not textile chemists or colorists, although somewhat interested in matters pertaining thereto. In order to maintain the high standard of the Association, the President was authorized to write them a letter stating that they were not eligible for membership in the Society.

The Treasurer reported that there is at the present time a fair amount of money in the treasury of the Association and that all bills are paid to date. This money is held in reserve so as to cover requirements of each member of Local Sections, and as a reserve for paying for publication of proceedings after first six months.

There are still some members who have not paid their dues for 1922.

A letter was read from E. H. Killheffer requesting permission for the formation of a New York Local Sec-



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 Proceedings of the American Association of Textile Chemists and Colorists
 

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tion. The petition was duly signed by thirty-eight members of the Association.

It was voted to authorize the formation of above Section, and E. H. Killheffer was elected Secretary pro tem., with authority to proceed with the formation.

The geographical boundaries of above Section were defined to include New York State and northern New Jersey.

The following applicants for membership in the Association were formally admitted to membership as designated, these names having been duly presented to the members of the Association in accordance with Article IV of the Constitution:

*Admitted to Active Membership—*

William C. Dempster, 644 Greenwich Street,  
New York, N. Y.

Edwin J. O'Brien, 2207 Dorchester Avenue,  
Dorchester, Mass.

George O. Linberg, 50 Belmont Avenue, Spring-  
field, Mass.

James R. Emmett, 92 Windsor Road, Waban,  
Mass.

Ambrose R. Chantler, 364 Potter Avenue, Prov-  
idence, R. I.

Frank Bromley, Box 128, Apponaug, R. I.

*Admitted to Junior Membership—*

Woodward Allen, Room 72, 89 State Street,  
Boston, Mass.

Eric T. Laurin, 40 Lundberg Street, Lowell,  
Mass.

The Secretary was authorized to immediately send out, in accordance with Article IV of the Constitution, all names of other applicants for membership.

The meeting of the Council was then adjourned.

W. E. HADLEY, Secretary.

### FORMATION OF NEW YORK SECTION

At the Council meeting of the American Association of Textile Chemists and Colorists held in Boston, January 13, a petition was presented requesting the formation of a New York Local Section.

The petition, reading as follows, was duly signed by thirty-eight members of the Association:

"We, the undersigned Charter Members of the Association, desire to organize a Local Section at New York and hereby request your official approval as required by the Constitution of the Association.

"E. H. Killheffer,	L. C. Lewis,
Chas. F. Schaumann,	Dr. Jos. F. X. Harold,
Giles Low,	A. E. Jury,
Jos. S. Unterweiser,	Thomas D. Ainslie,
W. E. Hadley,	J. H. Culver,
James L. Amsden,	P. F. Kingsbury,

Philip S. Clarkson,	Edward F. L. Lotte,
Frank C. Holden,	E. G. Quin,
H. J. Daignault,	Edward Mayer,
F. Xavier Lehmann,	Frederic Dannerth,
August J. Hunziker,	W. E. Mitchell,
J. M. Matthews,	D. P. Knowland,
Morton H. Wertheim,	Arthur F. Sampson,
Everett H. Hinckley,	S. Donald Perlman,
Herbert Grandage,	Elwood Hendrick,
Percival J. Wood,	R. M. Fischer,
Louis J. Matos,	John F. Warner,
C. A. Mace,	R. Norris Shreve,
W. R. Cathcart,	J. J. Sokolinski."

The petition met with the unanimous approval of the Council, and in accordance with Article XIII of the Constitution the Council proceeded with the election of a Secretary pro tem., E. H. Killheffer, vice-president of the Newport Chemical Works, being chosen for the office. Mr. Killheffer has been granted full power to call a meeting of members and proceed with the formation of such local Section.

The new Section of the Association is to be known as the New York Local Section, but the geographical boundaries of same are to include New York and northern New Jersey.

Attention was called to the fact that, in accordance with Article XV, members living in western Connecticut could affiliate with the New York Section, when formed, in case this proved to be more desirable.

The members of the Council are extremely pleased with the interest manifested by the members in the formation of local Sections, the formation of the New York Section being the third which has already been approved by the Council.

### ORGANIZATION MEETING OF NEW YORK LOCAL SECTION

Under date of January 26 the following letter was mailed to all members of the Association living in New York and northern New Jersey. Any members who failed to receive a notice are invited to be present:

Dear Sir—Please be advised that permission has been granted by the Council for the formation of a New York Section of the American Association of Textile Chemists and Colorists, to include principally the State of New York and northern New Jersey.

Will you please arrange to be in attendance at an organization meeting Friday evening, February 3, in Rumford Hall, Chemists' Club, 52 East Forty-first Street, New York City, at 8 o'clock?

Yours very truly,

(Signed) ELVIN H. KILLHEFFER,  
Secretary Pro Tem.

## MERCERIZATION

[Abstract of an address delivered by Roscoe L. Chase before the Rhode Island Section on December 30, 1921. Concluded from issue of January 16, 1922.]

The speaker quoted from Gardner's "Die Mercerization der Baumwolle" figures showing the amount of shrinkage produced by caustic soda of different strengths at various temperatures. [See table at foot of page.]

Referring to the increased affinity of mercerized cotton for direct dyes, he stated that the increase varies according to the strength of caustic used; also that mercerized cloth which has been subsequently steamed or dried dyes up lighter than cloth not so treated.

The speaker finally took up the subject of "Acid Mercerization," mentioning first Heberlein & Co.'s process (Fr. Pat. 468,821, Oct. 23, 1914) Sulphuric acid of 190 deg. Tw. and above has a gelatinizing and parchmentizing action on cellulose by which its strength is diminished, but below this strength there is practically no action during fifteen minutes. If the cellulose is mercerized first and then the luster destroyed by acid of 103 to 108 deg. Tw. the parchmentizing does not occur and the material becomes softer, denser and similar to wool. The period of treatment varies from a few seconds to several minutes. Phosphoric acid of 123 to 130 deg. Tw., hydrochloric acid of specific gravity 1.19, nitric acid of 85 to 94 deg. Tw., zinc chloride of 168 deg. Tw. at 60 to 70 deg. Cent. and a short treatment with ammoniacal cupric oxide bring about the same effect.

Heberlein & Co.'s process for pattern effects on cotton fabrics (Eng. Pat. 13129 of 1914) is as follows: Print concentrated sulphuric acid and wash, or print a resist and follow by treatment with acid and wash. The parts affected by the acid have a transparency. If the goods are first mercerized the effect is more distinctive but acid of over 108 deg. Tw. must be used. The parchmentized portions possess greater affinity for dyes.

Edmund Knecht finds that muriatic acid of 34 deg. Tw. has but little effect on the cotton fiber for a short period of time. Muriatic acid of 40 deg. Tw. rapidly dissolves cotton at ordinary temperatures and if poured into water yields a precipitate of cellulose (?). If bleached cotton fiber is steeped thirty seconds in muriatic acid of 40 deg. Tw. and then washed, the

fiber is badly attacked and becomes tender, harsh and brittle, somewhat similar to sulphuric acid of 140 deg. Tw. Muriatic acid of 36 deg. has no action, but at 37 deg. it not only has a shrinking effect on the cotton yarn but increases its affinity for coloring matters enormously without injuring the feel or tensile strength of the yarn. If successive skeins of cotton are immersed in muriatic acid of 37 deg. Tw., it gradually goes down to 36 deg. Tw. and the mercerizing action ceases. It is figured that the cotton takes up roughly 5 per cent more than would be accounted for by mechanical absorption. Acid of 38 deg. Tw. is even more effective than 37 deg. and the fiber shrinks more and has more affinity for dyes. Acid of 39 deg. Tw. begins to tell on the tensile strength and the yarn acquires a disagreeable harsh feel.

The following amounts of Benzopurpurine 4B were absorbed in a bath containing an excess of color (the estimations were done on the fiber by means of titanous chloride):

Untreated cotton .....	1.01% dye
Treated with HCl 38° Tw. wet .....	3.20% dye
Treated with HCl 38° Tw. dry .....	2.62% dye
Treated with HCl 37° Tw. wet .....	2.11% dye
Treated with HCl 37° Tw. dry .....	1.76% dye

The affinity for other colors, as Chrysophenine, Diamine Blue and Black, is also very marked. But towards sulphur colors and indigo the increased affinity is not so great. Strange to say, there is no increase in the affinity for tannic acid. Also for basic colors the treated cotton shows, if anything, a decreased affinity. The shrinkage noted was 4 per cent for the 37 deg. and 8 per cent for the 38 deg. A certain amount of curling of the fiber took place so that the dry skeins had to be well stretched before measuring. Two-ply Egyptian cotton treated at 38 deg. Tw. under tension did not produce luster.

## NOTICE OF MEETINGS

The next meeting of the Council will be held Friday, February 10, 1922, at the Engineers' Club, Boston, Mass., at 4 p. m.

A meeting of the Research Committee will be held at the same place at 4.30 p. m. of the same day.

Members wishing to bring any matters to the attention of these meetings will please communicate with either the President or the Secretary.

	35.6° F.	64.4° F.	86° F.	176° F.
At 23.2° Tw. the contraction was .....	12.2%	8.0%	4.6%	3.5%
At 42.0° Tw. the contraction was .....	19.2	19.8	19.0	13.4
At 52.3° Tw. the contraction was .....	22.7	22.5	19.8	15.5
At 64.0° Tw. the contraction was .....	23.5	23.5	20.7	15.0

(The above figures are for one minute exposure)



## SECOND RESEARCH COMMITTEE MEETING

The second meeting of the Research Committee was held Friday, January 13, at 4.30 p. m., at the Engineers' Club, the following members being present: Council, with exception of E. C. Bertolet and William D. Livermore, the latter being in New York attending meeting of Dye Advisory Board of Textile Alliance, Inc., as representative of American Association of Textile Chemists and Colorists. R. E. Rose and W. J. Murray were also present. E. F. L. Lotte and W. R. Moorhouse were unable to attend.

Considerable time was spent discussing the reprint of the "Second Open Conference of the Fastness Commission of the Section of the Chemistry of Dyeing and the Textile Industry of the German Chemical Society," same being a copy of a translation which had been furnished by a member of the Council.

It was felt that the entire subject of fastness was so extensive and had so many ramifications that it was only by taking one type of fastness at a time and disposing of that, provisionally at least, that any real progress could be made.

It was decided that two distinct phases of fastness requirements exist: first, the fastness as a specific property of dyestuffs themselves; and, secondly, the fastness required upon the type of dyed fabric under consideration.

In the matter of fixing standards of fastness for fabrics, it was pointed out that different standards must necessarily exist for different types of material such as cotton, flannel, woolen, worsted, etc. Also it was mentioned that madras shirtings would require a different standard than gingham.

It was pointed out that whereas the chemist and dyer must know what types of dyestuff to employ in each particular case to give the desired fastness upon a fabric, the only phase which need necessarily interest the merchant or the consumer would be the ultimate fastness of the colors upon the finished fabric.

It was decided to confine the attention of the committee to the subject of fastness to washing, for the time being.

The opinion was expressed that boiling in soap is a more vigorous treatment than the average colored wash, which might include the cheaper gingham, usually receives in the ordinary household washing. That the change produced by the first washing of finished goods is not, in some cases, a fair indication of fastness to washing, owing to the removal of sizes or other finishing materials and some loosely adherent dyestuffs, such as indigo and some of the other vat and sulphur dyes which the washing of the usual finishing processes does not remove.

The Association is interested both as chemists and as manufacturers, and must therefore consider two

phases of fastness: that of the fastness of dyes, and also fastness of dyed fabrics.

Manufacturers are selling materials to garment manufacturers, and the latter should be able to establish the fastness by reliable acknowledged methods before they cut up the material.

Attention was called to the fact that the opinion had been expressed by a number of manufacturers, not members of the Association, that a decided prestige would accrue to the Association if we could define fastness tests for dyestuffs and finished fabrics and have them accepted as official.

It was decided that it would be absolutely necessary that we have different grades of fastness for different types of fabrics such as cotton, wool, silk, etc.

It was mentioned (1) that the dyestuff manufacturers were primarily interested in the fastness of dyes; (2) that the selling house was interested in the fastness of the colors upon the fabric; (3) that the manufacturer and textile chemist were interested from both points of view and must choose dyestuffs which possess not only satisfactory fastness as such, but which must yield satisfactory fastness upon the fabric under consideration.

It was decided that, in the fastness tests, type colors must be designated in every instance to make the method of the greatest value. Also, that a good grade of neutral soap must be used and that the strength be based upon the dry soap.

It was voted that a subcommittee should be chosen to represent cotton, wool and silk fabrics.

It was the opinion of the Council that more would be accomplished by confining our efforts temporarily to washing of cotton, and as the different steps were satisfactorily determined proceed to the next.

It was decided to first formulate provisional methods which could be published, and after a reasonable length of time had elapsed, giving opportunity for criticism, they could finally be adopted as official.

Such a method should be accomplished by the statement that the proposed method is to be employed only *on the type of fabric designated*, and not upon any other fabric.

When dealing with type colors, both American and foreign, these should be designated by name, together with the Schultz number, as well as the Color Index number, as soon as that is available.

Type dyes only should be used the chemical composition of which is known, and these dyes should be specific compounds and not mixtures. Such dyes as Primuline, Benzo Purpurine and Immedial Indone R could be considered as specific substances.

(To be concluded.)

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

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## IN RETROSPECT—AND PROSPECT

IF all motion is relative, as physicists from Newton to Einstein have assured us, then one need have little hesitancy in asserting that the American dye industry has made most encouraging progress during the past year. But the employment of the qualifying phrase is made necessary, it is believed, by reason of the rather strong current of legislative and other difficulties which has continued to flow dead against it; so as to demand that any reference to this progress, in order to give it its due, be made in terms of relative, instead of absolute, motion forward. In other words, the industry has been in the position of the man rowing upstream who makes a certain speed as measured by the water, and a lesser speed as measured by the banks. If the current becomes too swift, he may actually lose ground while traveling forward. That the American dye industry should have made any progress at all is an eloquent reminder of its inherent vigor, and a very real tribute to the American chemist.

As to the present legislative situation, this has time and again received a thorough airing, and there is little to be added. It has been characterized principally by paralyzing inaction which has produced a state of uncertainty detrimental to the interests of both manufacturers and consumers of dyestuffs. Both recognize the need for definite legislation of some sort, but since this seems to be almost as far away as ever after nearly three years of discussion, the best that can be done is to bear the present highly unsatisfactory state of things with fortitude. Thousands of words of editorials have been printed by our daily press throughout the country, and some of these contributions have shown a woeful lack of knowledge of the fundamentals of the problem, which has not helped matters. Lack of general information on the part of the public continues to be one of the serious obstacles. Many schemes for protecting the dye industry and, simultaneously, safeguarding the interests of consumers, have been

suggested, yet up to the present the most logical appears to be the plan embodied in the pending Fordney permanent tariff. This, while not by any means perfect, has fewer objections than other plans, and there is little doubt but that it could be administered in a manner satisfactory to all interests.

The development of new colors has been encouraging and pleasantly indicative of the abilities of our technical men. This, however, cannot be prolonged indefinitely under the conditions which now exist, for the reason that the vast amount of research required is expensive, and to meet these expenses the dye manufacturers have in many cases been obliged to draw upon their reserve funds. This is one of the results of the ruinous competition which has sprung up.

The latter is one of the most important of the evils with which the industry is at present contending. It is also an effective answer to the oft-repeated charge that protection of the industry will bring about an American dye monopoly. The industry is at present protected by the licensing system, administered by the U. S. Treasury Department, and under this system it receives rather more in the way of protection than is contemplated by the Fordney tariff. Notwithstanding this fact, American dye manufacturers are at present competing with each other in the matter of prices for identical products to a degree which cannot be maintained. If efficiently conducted, the investigation of the industry which is just now getting under way as a result of the King resolution should not fail to show this.

An instance or two will serve to make this condition clear. In one case an agent for a manufacturer was selling a product to a consumer at \$1.50 a pound. This was regarded as a fair price by the consumer, who made no objection whatever to paying it, and was thoroughly satisfied with the product. The seller was making a small profit at that price.

Presently another agent made a bid for this business, offering the same product of the same factory. When told it was already being used, at a price of \$1.50, he offered it for \$1 a pound, sacrificing the profit to get the business. Shortly afterward, a third agent offered the identical product of the same factory at 65 cents a pound. Now none of these agents is making any money and the consumer himself is receiving no permanent benefit because this price cannot be maintained.

Again, there is an authenticated instance where two concerns, whom we will call "A" and "B," were each making a color greatly in demand by the cotton industry. These two were, moreover, the only American manufacturers of this product. "A" was supplying it to a large print works at \$4 per pound—a price which just about covered his costs. In an effort to get this business, "B" offered the product at \$2 per pound—a price which meant a large loss on every pound sold. Being advised by the print works of "B's" offer, "A" felt compelled to meet the lower price and, his product being slightly superior, continued to get the business. In other words, the only result produced by "B's" foolish tactics was to



compell his competitor to sell his goods at a loss. And, again in this instance, there is no permanent benefit to the consumer, as neither concern can long maintain this profitless selling.

This is the "monopoly" feared by Senator King and others!

Another bar to more rapid progress is believed to be the fact that the American industry, unlike the German, does not, as a general rule, possess technical men as executives. The heads of the Interessen Gemeinschaft are recruited from men who have received an exhaustive schooling in the laboratory and in the plant, and who, in addition, are also gifted with executive and business ability—a combination of qualities hard to obtain and which only results from the early setting up of exacting requirements for leadership. The business ability of our own dye manufacturers' executives is unquestioned, but their early schooling has been, in many cases, rather along the lines of finance than organic chemistry. A complete understanding of both is necessary to secure such results as Germany achieved, and in view of the impending competition from that quarter, the very best we can offer will not be too good.

We have already brought over a number of German color chemists to help us save some of the additional time for research which would otherwise be required for the development of new colors, and it would seem as though we might profitably borrow yet another idea from Germany by duplicating her employment of technically trained executives.

It is only such as these that can instantly detect a weakness and remedy it before much damage is done, and it is likewise only such as these that can realize to the fullest extent the potentialities of the industry, and so build for the future day by day.

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#### "WHERE THERE'S A WILL—"

SOMETHING like a year or so ago there was begun, in the vicinity of New York City and perhaps elsewhere, an advertising campaign for the introduction and exploitation of a new toilet preparation. This campaign, which at best was never a very pretentious one as such things go, and which was carried on principally in the subways and surface cars of New York, and in the suburban trolleys, of late has appeared to languish. Nevertheless, it did contain one exceptional feature, a hackneyed, shop-worn phrase, used hundreds of times before by hundreds of advertisers and glanced at uncomprehendingly, because of its sheer triteness, by thousands of readers—a phrase which had become, indeed, through long usage, so familiar that it had ceased to convey any meaning whatever. Yet by the clever use of italics in such a manner as to place the emphasis in a new and totally unexpected place, and by an equally clever arrangement of type matter so as to give it more prominence without unduly increasing its size, this verbal relic was metamorphosed into a thing of almost superb power.

Some readers may recall having seen it, but this is doubtful. However, at the bottom of every car-card and poster it regularly appeared during the early months of the campaign, thus:

"Your dealer can *get* it!"

Now, it is held by some that there are reasons why this particular handling of this particular phrase in its application to the particular product referred to is worthy to rank as an advertising achievement somewhere near the classic You-press-the-button-we-do-the-rest which made a fortune for the Eastman Kodak Company. We should like nothing better than to advance these reasons and to discuss them, for they are highly interesting. But we cannot do so here. The point is that the American dye industry possesses, ready at hand and waiting to be employed, the very slogan or phrase best calculated, it would seem, to deliver its most important message to the public and to clear away more misunderstanding than all the painstaking, carefully worded magazine articles put together.

Is there no dye capable of giving satisfactory results on such and such a fabric?

There is.

Your dyer can *get* it.

Your dyer *can* get it!

And the chances are strong that he can get it from an American dye manufacturer, if you refuse to accept excuses and thus make him want it badly enough. As long as you permit him to foist cheap work upon you on the pretext that nothing better is obtainable, he will continue to do so—and pocket the difference.

Think this over: The consumer is king. What he persistently demands, some one will supply. And it will be supplied at a fair price, too. No group can establish a monopoly of a manufactured article in this country and consistently hold the price up beyond that point which permits a reasonable profit. Particularly is this true in the manufacture of articles depending upon science for their existence, such as coal-tar colors. There are too many alert, scientific minds, and too many separate groups of men with unlimited capital ready to be shown the way to a quick fortune by undermining—or underselling—already established groups in various lines. The thing has happened over and over again, and is so self-evident that it is puerile to talk of a dye monopoly here under any circumstances, embargo or no embargo.

We believe most of our scientific readers will agree with us when we say that if every chemist and chemical engineer in the country, under the stress of sudden, dire need, were, collectively, this week to begin giving their undivided attention and efforts to the problem, in the course of a week, or a month, or a year, some way would be devised of manufacturing sulphuric acid yet more cheaply. It might come from the most unlikely source, and in the most unlikely way. But surely no man of scientific training would be so rash as to say that the last word has been reached. No man could say with authority that it had been reached even if the cost of manufac-

ture were to-morrow reduced to one-tenth of its present amount.

Therefore, we may accept as fully demonstrated the proposition that a concerted, unyielding demand on the part of the public for first-quality colors, without any material increase in the cost of apparel dyed with these colors, would be met by some one, somewhere. Further, it may be accepted as a fact that it would be met by Americans.

The reason why it is not being met more generally to-day is because such a demand does not exist. A *wish* exists, but not a *demand*. The reason why no demand exists is because the public, as a whole, is not aware that it has the *right* to make such a demand.

The people of the United States have been misled into thinking that they are fortunate in getting even such unsatisfactory results as they frequently do get from garments colored with American dyes. The fact of the matter is that the dye manufacturers, who are perfectly capable of giving the public what it has a right to demand, have received from garment manufacturers very little real encouragement to put forth their best efforts. Only the public can remedy this condition, and hence it would seem that the dye industry would do well to "turn informer" and let the public know all about those who have been at so much pains to suppress the truth concerning their capabilities.

There is not the shadow of an excuse for obviously inferior dyeings on goods purchased for a fair price from otherwise reliable dealers with established reputations. More often than not the fault lies somewhere back of the dealer himself, but in nine cases out of ten it stops short of the dye manufacturer.

To repeat: The dyer can *get* it! By "the dyer" we do not mean the individual who applies the dye to the goods, but the head of the establishment which employs him or the firm which orders him to dye "at a price." If the latter cannot get it from an American manufacturer, he can get it from a German, or a Swiss. He is not denied this privilege, even under the present defective system of protection, and if he declares that the Treasury Department will not permit him to exercise it, you may depend upon it that he *can* get what he needs somewhere in America—and the Treasury Department can tell him where. Further, if he can show that the Treasury Department is wrong, which should not be difficult, assuming that a mistake really has been made, he will be granted permission to send abroad at once.

We are not certain as to just how far the use of slang will be condoned by readers of these columns, but we shall at least risk the declaration that if the dye makers will strongly emphasize the point that the dyer can *get* it, we are sure that the public will "get" it, and act accordingly.

## A CONSTRUCTIVE CONTRIBUTION TO THE DYE LEGISLATION CONTROVERSY

THROUGHOUT the thirty-two months since the effort to stabilize dye import legislation began—and even before that—the minds of those concerned with this problem have not been concentrated merely on the creation of a plan whereby manufacturer and consumer should alike be protected, which by no means presents difficulties requiring nearly three years to eliminate. What has been sought as a necessity is a plan that would accomplish these things without presenting features which could be made into political issues by enemies of the industry. It is this which has proved to be the almost insurmountable obstacle.

Back in 1919, nearly everybody had a scheme for the salvation of the industry and the propitiation of Congress. Subsequently, when much of the general sentiment had crystallized in favor of the licensing system, and this was being urged by Representative Longworth, ideas were still fairly numerous. But with the advent of the present limited embargo proposal the erstwhile flood of amateur legislators rapidly subsided, and there ensued a drouth.

It is with real interest, therefore, that The REPORTER receives from an American dye manufacturer the first sane and really constructive suggestion for a solution of the problem which has come our way in months. The author of it makes plain his desire that it be regarded as tentative only, and seeks other opinions as to its feasibility. It displays every evidence of careful thought and a most intimate familiarity with the usual objections raised by opposers of dye protection; and hence, because it forms a highly interesting subject for speculation as to the possible treatment it would receive in Washington, and because we believe in giving the widest possible circulation to every contribution to general thought upon this subject, we herewith present it for the consideration of readers.

This plan would give to the dyestuff industry protection in the form of such ad valorem and specific duty rates as might be determined upon, coupled with the usual provisions against dumping.

But it would add a special stipulation, however, to the effect that if at the end of any fiscal year the President should find that more than twenty-five per cent of the total dyestuff requirements of the country, for all purposes, had been imported, he would then be empowered to prohibit by proclamation the importation of foreign dyes except subject to licenses granted by the Tariff Commission. We quote:

"These licenses shall only be granted for such dyes as are not made in this country, and for which no substitute made in this country having the same chemical composition or characteristics can be employed. This prohibition shall continue until such time as the price of the domestic product may be increased until it is twenty-five per cent higher than prevailed at the time of the proclamation."

That the American dye industry would not be wiped



out by unrestricted—save for the duties noted—competition up to twenty-five per cent of the country's total requirements for all purposes, we may accept, for the sake of argument, without question, since the proposer is himself a manufacturer. Granting this, then, one must take account of the fact that under such a law there would almost certainly be two classes of colors imported, i. e., some not obtainable here, and some already being made here. There must also be taken into consideration the fact that under such duties as Congress would consent to impose, the Germans could and would undersell our manufacturers on any imported product coming into direct competition with an identical domestic product.

The question now becomes one of whether those who preferred sending to Germany for colors already obtainable here, because of lower prices or other reasons, would absorb a large enough portion of the stipulated twenty-five per cent of the total requirements to force others, seeking unobtainable products, to swell the total to a point above the twenty-five per cent for the year. Evidently our correspondent believes not, but there may be some who would disagree with him in this, or at least regard such confidence as based upon mere speculation rather than demonstrable fact. On first view there would appear to be many reasons why a Presidential proclamation at the end of the first year might be considered as inevitable; yet on looking deeper into the possibilities it is extremely interesting to reflect that the Germans might logically be expected to work against this, even to the extent of refusal to sell any more dyestuff tonnage than just enough to keep inside the limit, since their total sales under this system would be greater than would be the case under the licensing ban which would immediately be imposed. Carrying this idea still further, there is the question of imports from Switzerland and England, which would further cut down Germany's total of possible sales and make it difficult for her to calculate her exports so as not to overshoot the mark, yet at the same time send us the maximum amount allowed by the limit. Finally, it must be remembered that American consumers themselves would in all likelihood take a hand and agree to prevent a return of licensing by refusal to purchase more than twenty-five per cent of their requirements abroad per year.

There are many other angles from which this plan might be developed, and all are interesting. But suffice it to say for the present that it appears to be an ingenious and well-balanced scheme for accomplishing the purposes in mind.

Moreover, there is nothing in it to which Congress could take serious exception. It is extremely liberal in its treatment of consumers, and frees them completely from all forms of harassing red tape. There is no such word as "embargo" for the free-traders to make a target of, and the possibility of the actual application of the licensing system can be shown to be rather remote.

The "monopoly" objection disappears utterly, and not even Senator King himself could put together any kind of an argument on this score. A monopoly could scarcely exist while nearly a quarter of our domestic requirements were being imported from abroad. On the other hand, it gives adequate protection, since, should importations become so heavy as seriously to imperil the life of the American dye industry, one would go the licensing system. Then, should our dye makers attempt to take advantage of this to raise prices, away would go their protection again.

In short, the very best feature of this plan is the promise it holds out of freedom from hampering regulation of any sort, since all three factors—American dye manufacturers, American consumers and German dye manufacturers—could only injure themselves by excesses of any kind, and hence would logically become self-regulating.

An amendment which The REPORTER feels would improve the suggested measure somewhat would make the final paragraph read: "This prohibition shall continue until such time as the price of the domestic product may be increased until it is twenty-five per cent higher than prevailed at the time of the issuing of the proclamation, *or until one year from the time of the issuing of the proclamation.*" As the plan stood before, licensing of a given product, once imposed, would continue indefinitely as long as American manufacturers did not exceed the twenty-five per cent limit for increase in price, which proceeding would, no doubt, be objected to by consumers. Nevertheless, this is another contingency so remote as scarcely to be worthy of notice, since no manufacturer would deliberately raise the price of a product to a point where he knew it would result in taking his market away from him.

It would be interesting to hear a Congressional debate on such a measure as this. Stranger things have happened, and should Congress again fail to agree on the Longworth proposal, it is at least certain that something else will be tried. Meanwhile, we should be glad to hear the views of readers.

### **Dr. Herty's Jersey City Address— A Denial and a Reply**

**D**ENIAL of certain statements attributed to "an American chemist on a visit to Germany" in a letter read by Dr. Charles H. Herty, President of the Synthetic Chemical Manufacturers' Association of the United States, during the course of a recent address before the Chamber of Commerce of Jersey City, N. J., has been made in a communication to The REPORTER from Dr. Nicolas Ernster, who declares that the American chemist in question was himself, but that the letter purporting to quote his statements was inaccurate.

In the interest of accuracy, therefore, Dr. Ernster's communication was forwarded to Dr. Herty. Both Dr. Ernster's denial and Dr. Herty's reply are here given.

The passage referred to, as readers may recall, ap-

appeared in The REPORTER of December 12, under the general heading, "Germany Holds Fast to Pre-War Trade Methods." This article gave extracts from Dr. Herty's Jersey City address during the course of which he read the report of the German Commercial Attache in Rome to his chief in Berlin, recommending the fomentation of Italian discontent in order to break down the legislative barriers against German dyes and chemicals.

The article in question concluded with some paragraphs under the subheading, "German Spying System," and stated that "another interesting point brought out by Dr. Herty in his address was the fact that, just as Germany had perfected a remarkable system of sabotage during the war, so has she built up a spying system in the industrial war which she is now waging. To illustrate this point, Dr. Herty quoted from a letter which he received November 23 regarding the experiences of an American chemist in Germany. This correspondence follows:

"Dr. ———, who is with the ——— Company, has just returned from a trip to Europe, where he went at the request of his employers, as I understand it.

"He saw quite a few people, and among them Dr. Von Weinberg, whom you know; and Dr. Seeböhm, formerly of the Bayer Company and now with Griesheim Elektron.

"In conversation with Dr. Von Weinberg, this gentleman remarked that he knew exactly what the National Aniline & Chemical Company plants had cost, and, if an embargo were put on dyes, they would immediately begin to build and they would build a plant for just one-tenth of what it had cost the manufacturers to build their plants here, and also spoke of their experience, which would naturally be of great use to them.

"Dr. Seeböhm, who, you know, is a brother-in-law of Duisberg, very much astonished Dr. ——— by telling him their (the ——— Company's) yield in August was only so much on certain dyes, where it was higher the month previous; and admitted he had data of the yields and productions of all the dyestuff manufacturers of this country.'"

It was the passage quoted above which drew forth the following letter from Dr. Ernster:

North Billerica, Mass.,  
January 5, 1922.

To the Editor of The REPORTER:

In your edition of December 12, 1921, you published a report of Dr. Herty's address before the Chamber of Commerce of Jersey City, entitled "Germany Holds Fast to Pre-War Trade Methods." The last chapter of this report describes the "German Spying System," and is supposedly based on the report of an American chemist, Dr. ——— (no name given), about his experiences in Germany.

To my great surprise I found that I was the chemist in question. Admitting this to be true, I would like to make a few corrections to Dr. Herty's report. The information was apparently given to him by a young man-

ufacturer in New York who was quite a bit upset by a talk I had with him about Germany—that is, her conditions, and especially the state of her chemical industry.

Now for the facts. I did not have any business talk at all with Dr. Von Weinberg, but with his representative, Dr. F———, and later with Mr. Seeböhm. I must confess that both gentlemen talked very sensibly, and, as can be easily understood, were rather reticent about American conditions. Dr. Von Weinberg, for a good reason, stated above, did not make any of the remarks referred to by Dr. Herty; and as to Mr. Seeböhm's supposed remark about the monthly output of the plant where the writer is employed, it is rather silly, considering that the plant was not in operation for months before the date mentioned.

The talk that the writer had with Dr. Herty's informant about the German chemical industries, the low cost of German manufacture, comparative market prices, etc., left the latter more or less perplexed. Some—I say some—of the remarks which he attributes to the two German business men were merely personal arguments of the writer in a discussion that arose about the conditions in the two countries.

It is rather surprising to me that Dr. Herty made such strange assertions on mere hearsay, and did not try to get first-hand information.

In the hope that your esteemed paper will print these few lines for the sake of truth, I remain, etc.

[Signed] Dr. NICOLAS ERNSTER.

To which Dr. Herty makes the following reply:

[Letterhead of the Synthetic Organic  
Chemical Manufacturers' Association  
of the United States]

To the Editor of The REPORTER:

I appreciate your courtesy in forwarding me for reply a copy of a communication from Dr. Nicolas Ernster.

I did not give names in the course of my Jersey City address, as I had been requested not to do so.

The only reply I desire to make to this communication is a request that you print the attached material, which I think speaks sufficiently strongly on the point, adding only that it is interesting to note how readily Dr. Ernster recognizes himself as the one quoted, though he denies making any such statements.

CHAS. H. HERTY,  
President.

The letter attached to Dr. Herty's reply follows:

[Letterhead of Zinsser & Co.,  
Hastings-on-Hudson, N. Y.]

To Dr. Charles H. Herty:

Your communication enclosing copy of a letter from Dr. Ernster to the AMERICAN DYESTUFF REPORTER is just received.



I dislike very much getting into a discussion with the Doctor, but as he questions the truthfulness of the statements made to you, I wish to repeat again the conversation he had with my son, the head of our dye sales organization, and a third person.

Dr. Ernster did state that the German manufacturers, among whom he mentioned Mr. Seebohm, had complete records of the activities, yields and methods of the American dyestuff and chemical plants. In this connection he mentioned that the person with whom he spoke took from his files a paper from which he read the details.

He furthermore stated that his informant told him that, in case of an embargo, the Germans would at once begin to build, and that they knew the exact cost of the plants in this country and could duplicate them at a small fraction of their original cost. This information was given as coming either from Von Weinberg or one of his assistants.

The Doctor, furthermore, wrote to our Sales Manager during Christmas week, sending him the season's greetings; and one of the paragraphs in this letter is as follows:

"I was surprised and amused to read in the AMERICAN DYESTUFF REPORTER of December 12 of a report by Dr. Herty on the German spy system.

"I should be interested to know if Dr. Zinsser sent that letter to Dr. Herty, and why he was afraid to use my name. If that was the case, I might have given him a lot of additional information."

I do not know what caused this recent change of heart on the part of Dr. Ernster.

The fact that my understanding of this whole conversation is correct is attested to by the signatures hereto attached.

[Signed] F. G. ZINSSER.

We have read the above statement and hereby affirm that it is substantially correct in all its details.

[Signed] J. S. ZINSSER.  
F. X. LEHMANN.

## DYEING AND PRINTING OF FOULARDS

(Continued from page 84.)

they stain the whites but little, if at all. As most patterns printed on foulards have delicate outlines, the color mixer should make a proper selection of the thickener to be used, the best being gum senegal used alone or in combination with Dextrine (white) or British gum (brown or canary). Various patented or proprietary thickening agents are brought out from time to time, claimed to possess special value for certain kinds of work, but a skilled color mixer can always, in conjunction with the printer, decide upon the proper mixture of ordinary commercial thickeners to use or make up.

The following working formula will be of interest:

	Parts
Color .....	1/2 to 3
Water .....	45 1/2 to 39
Phosphate of soda.....	1 to 3
Glycerine .....	3 to 5
Gum solution (thickeners).....	1:1 to 50

These are compounded by dissolving the color in the water, at the same time putting in the phosphate of soda and glycerine. Stir well, with the aid of heat, and when solution is complete pour into the thickener and continue stirring, first with heat and continually as it cools off.

### COLORS AVAILABLE

The colors generally available for this work follow:  
Yellows—Thioflavine S, Diamine Yellow CP, Diamine Fast Yellows A and FF.

Pinks—Direct Rose T, Diamine Rose.

Scarlets—Oxy Diamine Red S, Diamine Purpurines, Diamine Scarlets B and 3B.

Dark Reds and Clarets—Diamine Fast Red F, Diamine Bordeaux S, Diamine Brilliant Bordeaux R, Diamine Brilliant Scarlet S.

Violet—Diamine Violet N, Diamine Fast Violet FFBN and FFRN.

Bright Blues—Diamine Sky Blues, Diamine Pure Blue A.

Navy Blue—Diamine Blues 2B, 3B, 3R, RW, Diamine Steel Blue L.

Greens—Diamine Greens B, G, etc.

Browns—Diamine Browns 3G, B, MR, Cotton Brown A, Oxy Diamine Browns 3GN, RN, Diamine Catechines G, 3G, B, Diamine Fast Browns G and R.

Grays—Diaminogene Extra, Diamine Dark Blue B, Diamine Fast Gray BN.

After printing, the foulard is hung to dry; but drying should not be retarded nor forced too rapidly, nor too sharply—that is, the printed cloth should not be made "bone dry." Steam for about three-quarters of an hour, seldom over one hour, in a cottage steamer, giving a pressure of from 3 to 3 1/2 pounds.

If steaming without pressure is resorted to, there is always a possibility of moist steam, with the liability of some of the colors running into whites.

After steaming, wash the fabric with cold water in a broad washer, and afterwards brighten by giving a passage through a weak acetic acid sour, then whiz and dry.

Discharge effects produced upon plain colored grounds require that the foulard be dyed perfectly level, which requires that all the conditions above noticed should be given close attention.

The dyeing is done preferably in large wooden dye tubs, the cloth being worked slowly over a winch, and adding further quantities of colors from time to time until the correct tone and depth are obtained.

The choice of colors for this kind of work is limited to such as go on the goods slowly and evenly, and which are capable of complete discharge with Hydraldite, leaving a clean white for the figure.

#### DYEING

Dyeing is carried out in the following manner:

The dye bath is prepared with 4 per cent of acetic acid and the proper quantity of color, which must be first completely dissolved and added to the bath through a fine sieve; this prevents the possibility of undissolved particles of dye spotting the goods.

The goods are entered at a temperature of 200 deg. Fahr. and dyeing continued at this temperature for half an hour; then add in several portions about 4 per cent more of acetic acid, and work for half an hour longer without any increase of heat.

Some special colors require an addition of 2 to 4 per cent of sulphuric acid instead of acetic acid.

After dyeing, lift, rinse well and dry without brightening.

Blacks are produced on silk fabrics most commonly by the so-called diazotizing and developing process, which is as follows: After dyeing as above with Oxy Diaminogene, Diaminogene or Diamine Black BH, rinse well and work for one-quarter of an hour in a cold bath containing:

	Per Cent
Nitrate of soda.....	3
Muriatic acid .....	9

Rinse and at once, in a ready prepared bath, develop and fix the color by working from one-quarter to one-half hour cold; then rinse, pass through a hot soap bath, and brighten.

The developing bath is prepared by dissolving 1 per

cent beta-naphthol (of weight of the goods) in an equal weight of caustic soda lye 75 deg. Tw., or  $\frac{3}{4}$  per cent Phenylene Diamine in  $\frac{1}{4}$  per cent soda ash.

After the dyed goods have been made ready for discharging they are batched and put on the machine.

For white discharge the following "color" is used:

	Parts
Hydraldite CW Extra .....	250
Gum water 1:1.....	750

Heat to 160 deg. Fahr. for one-half hour and stir until cold, and then force through a fine sieve or grind in a ball mill.

After printing on the discharge, dry the cloth lightly, but do not leave it moist, and pass through hot steam for a few minutes, keeping the temperature in the steamer at 211 deg. Fahr., or close to that point.

After steaming, pass for eight minutes through a cold sour made by adding  $\frac{1}{2}$  ounce of muriatic acid per gallon of water, finally rinse, and brighten with acetic acid as for direct prints.

Colored discharges are easily produced by using a formula based on the following one from practice:

	Parts
Color .....	2 to 5
Water .....	48 to 55
British gum .....	250
Hydraldite CW Extra .....	150

The dyes chiefly used for colored discharge work are basic in character, and are selected on account of the brilliancy and life they give to the finished foulards, especially when applied to blacks, deep blues and deep browns.—"Posselt's Textile Journal."

## Sir William Alexander Declares Co-operation of All Factors Is Only Means for Defeat of German Dyestuff Aims

Makes Plea to British for "Empire Policy" in Dealing with International Situation—Manufacturers, Consumers, Chemists, Labor and Government Must Work Together—Deplores Use of Printing Presses to Raise Credits

**T**HROUGH the courtesy of "The Chemical Age," of London, and at the request of the author, The REPORTER is privileged to present in this issue the latest words of Brigadier-General Sir William Alexander, Chairman of British Dyestuffs Corporation, Ltd., and Managing Director of Charles Tennant & Co., of Glasgow, regarding the international dyestuff situation.

Readers will remember that while Sir William was visiting this country last fall he gave to this publication an interview in which he discussed international conditions, which appeared in the issue of October 24;

and which, because of its authoritative source, and its sane, logical grasp of the world situation, at once attracted considerable attention in the American industry. In that interview the British manufacturer dealt more particularly with the problem of America in relation to the international field, while in the present one, published in "The Chemical Age," he is addressing his fellow countrymen. Nevertheless, his words should be of extreme interest to Americans because of the similarity between the dye problems of the two nations.



Sir William enters a strong plea for an Empire policy for the development of the British dyestuffs industry, which was greatly enlarged for war purposes. Great Britain itself, he states, has facilities for supplying at least the entire requirements of the British Empire, and he sees no reason why British manufacturers should not have this trade.

He estimates that as a result of war expenditures the various capacities for dyestuffs production in existence to-day could turn out a total of 86,000 tons per annum, exclusive of Germany, whose pre-war trade was 135,000 tons, and whose capacity is now much greater.

While admitting that, in the past, concentrated effort on the part of Germany has left England behind, he denies emphatically that Germany possesses better scientists, chemists, engineers or wage-earners than England does. The new and extensive British dye works, capable of employing large numbers of men, cannot be allowed to become derelict, either in the interests of national security or in the interests of the commercial prosperity of the Empire.

Sir William is confident that England will be able to maintain these plants in operation for the benefit of the nation if certain recommendations which he makes are complied with. These call for co-operation on the part of consumers, chemists and engineers, labor, and the Government; they are logical and necessary if the desired results are to be achieved, and might well be applied with equal force on this side of the water. They will be found in the complete statement hereafter.

Referring to the reconstruction of European trade, Sir William points out that the employment of printing presses on the production of paper notes is a disastrous means of raising credit, and one which must inevitably lead to commercial chaos and bankruptcy, and condemns export credits and other schemes introduced for the establishment of trade on long-deferred credit as only leading to encouragement to European countries to rush into debt for goods they cannot pay for. He states in conclusion that a trade recovery must be gradual if the best interests are to be served, but that unless it can have cheap coal and cheaper transport, British industrial development will be materially retarded.

His statement, in full, follows:

"Few, if any, of those occupied in the control and administration of industrial concerns will shed tears over the passing of 1921. For manufacturers, especially, committed to heavy overhead charges and running expenses, and responsible for the employment of masses of wage-earners, it has been a year of apprehension and anxiety. Following on a short post-war boom of exceedingly speculative trade and production, stimulated by overconfidence, extravagance and artificial credits beyond the limits of sound finance, the first whisper in the autumn of 1920 of insolvency on the part of nations and firms accelerated the rapid de-

velopment of financial mistrust, commercial stagnation and all the evils which automatically follow in such a trail.

"The year 1922 opens with little more tangible than the pious hope of a change for the better, but it is to be expected that the drastic medicine administered under the force of critical circumstances will shortly effect a slow but sure cure, even in spite of the prevailing world adverse economic conditions.

"Money which should to-day be employed in industry is accumulating in vast sums on deposit in the banks, a very unhealthy sign, and will not be rectified until confidence is restored.

#### INDUSTRIAL CHEMICALS AND DYESTUFFS

"Chemicals, to a greater or lesser extent, and at one stage or another, enter into the production of almost every class of manufactured commodities, and for this reason the chemical market has been designated the barometer of general trade. Similarly the demand for dyestuffs gives a good indication of the prosperity or otherwise of that very large and important group of British industries falling under the classification of 'textiles.'

"These two groups, chemicals and dyestuffs, are very closely associated and form two of the most important and valuable key industries which a nation can possess. They ought to be vigorously developed and closely guarded. Their importance was early recognized by Germany, where they are amalgamated and run by that powerful organization the 'Interessen Gemeinschaft,' with a total capital of over 2,000,000,000 marks, nominally £100,000,000. The chemicals and dyestuffs plant of this huge organization proved an asset to Germany in the late war, for propellants, high explosives, poison gases, etc., which was invaluable and gave to her in the critical stages a predominant possession of supplies for which Britain was starving.

"Recently a similar organization has been established in America, combining heavy chemicals, coal-tar products and dyestuffs under the control of 'The Allied Chemical & Dye Corporation,' and a recent visit to America convinced me that there is in America a determined post-war policy—shared alike by producers and consumers—to protect American home industries, especially chemicals and dyestuffs.

#### LESSONS FROM THE PAST

"A short review of the past history of British interests in these two groups, with a few suggestions for their future, may be interesting and instructive. Great Britain was largely responsible for the origin, utilization and development of chemicals and dyestuffs for industrial purposes, and the discovery of dyes extraction from coal tar—which revolutionized the art of dyeing—stands to the credit of a British scientist. Although she built up and maintained, in spite of foreign

competition and against protective tariffs abroad, a large and creditable chemical manufacturing industry, Britain utterly failed to realize the prospective value of dye making by following up her own discoveries and developing in practice an industry in which she held an unique advantage as far as raw materials were concerned.

"Consequently, prior to the war Germany had been presented with practically a world monopoly of a very great and profitable industry having a direct trade of about 135,000 tons per annum out of a total world's consumption of about 160,000 tons, and giving direct and indirect employment to hundreds of thousands of persons, and livelihood to probably four times the number. If to these figures are added those employed in the outside German chemical industries the numbers will be very substantially greater.

"Let us now investigate the influence of established German chemical and dyestuffs plant from the moment war was declared. Germany was enabled to switch over from peace-time production chemical plant to the output of propellant components and high explosives, subject only to extensions to meet increased demand, and dyestuffs plant to those new and deadly effective weapons of war included in poison and toxic gases. British chemical plants, fortunately existing, were also promptly adapted to the production of propellants and the older classes of warfare munitions covered by nitro-cellulose compounds, while necessary additions and extensions were put in hand.

"Trench warfare, however, soon called for high explosives, such as TNT, picric acid, ammonal, etc., and later for poison gases, and the absence of dyestuff plants in this country and experience in mass production was a serious handicap. No alternative existed but to design and construct plant and train chemists and engineers to deliver the goods from such plants as were erected at Gretna, Queensferry, Huddersfield, Blackley and elsewhere.

"During the construction and equipment of plants in this country it became essential to purchase in America vast quantities of propellants and high explosives at high premiums against credits which drained the country of its gold reserves and negotiable securities. It should be noted, however, that once the country had installed the facilities, the results obtained from the operation of plants—many of them entirely novel—under British chemists and engineers were not surpassed in efficiency by any other nation, Germany included. This fact ought to be borne in mind when we are discussing the maintenance and operation of the plants now existing for peace-time production.

#### WORLD'S INCREASED OUTPUT CAPACITY

"As in our own case, other countries—notably America, Japan, Italy, France and Germany—find themselves with new or largely extended capacity for chemical and dyestuffs, so that to-day the world's power to

consume these commodities is far below the world's capacity to produce, and Great Britain itself has facilities for supplying at least the entire requirements of the British Empire.

"Is there any reason why we should not have this trade? As a result of war expenditure it may be estimated that the following capacities for dyestuffs exist in up-to-date plant: United States, 32,000 tons per annum; Great Britain, 30,000 tons; Switzerland, 12,000 tons; France, 8,000 tons; other countries, 4,000 tons—a total of 86,000 tons per annum, exclusive of Germany, whose pre-war trade was 135,000 tons and whose capacity is now much greater. Although such surplus capacity may mean a peace-time war of elimination, have not these two solvent nations, Great Britain and America, every chance of pulling through when they are uniquely and satisfactorily placed for all the raw materials, if application and determination be added?

"I will admit that in the past concentrated effort on the part of Germany has left us behind, but I have yet to learn that the quality of German brains is superior to those of our own scientists, chemists, engineers and wage-earners. Neither in the interest of national security for the future nor in the interests of the commercial prosperity of the Empire can we allow these new and extended installations, capable of employing so many citizens, to become derelict. We have the power to maintain these plants in operation for the benefit of the nation—

"1. If British Empire consumers will support their own Empire industries in the same sympathetic spirit as shown by Australasia, for example.

"2. If British chemists and engineers responsible for running plants will concentrate with determination towards maximum efficiency.

"3. If British labor will recognize that maximum production per unit of labor or plant is the greatest security for regular and good wages and low cost of living.

"4. If the British Government will continue to assist British industries to fight against depreciated currencies and other handicaps to fair trading on equitable terms.

"5. If the British Government will realize that its consuls and trade commissioners overseas should be competent, commercially, to pioneer, advertise and assist in the development of British trade.

#### GOVERNMENT ASSISTANCE

"Reference to British Government assistance compels one to comment on past efforts and methods. Government acts and forms of legislation should be communicated in definite and simple language and clear to the understanding of those called upon to conform to the provisions. This has not been the practice, and acts are so ambiguous and indefinite in wording that only 'wizards' could be expected to interpret the in-



tentions. Consequently, exasperation, irritation and lengthy litigation are often the immediate result.

"Let us analyze only two typical cases affecting the particular industries under review. The Royal Proclamation of 1919 dealing with the importation of foreign dyestuffs was wrongly drawn, having regard to the law, and its illegal nature having been made clear by the Sankey judgment, this new industry was left for twelve months at the mercy of German dumping to the serious financial prejudice of an industry which the British Government had committed itself to protect. More recently, one follows with regret the numerous and contentious discussions arising out of the nebulous, academic but non-commercial clauses of the Key Industries act involving lengthy and costly arbitration as to what constitutes 'a synthetic organic chemical.'

"Key industries should surely be more simply definable than by meticulous class and scientific descriptions always open to argument. Does not the title indicate as 'Key Industries' those productions for which the country is advantageously placed from the point of view of raw and semi-manufactured materials, for which she possesses the requisite efficient plant and knowledge, and which will employ British labor and yield in return commodities at such prices as will inflict no hardship nor put out of business those who are consumers?

"If we can realize these aspirations there is no reason for despondency as to the future welfare of the chemical and dyestuffs industry, or, in fact, any large industry where good facilities are available.

#### RECONSTRUCTION OF EUROPE

"The trade slump of 1921 has shaken confidence to its foundations. It is to be hoped that a beneficial lesson has been taught as a result of the wild speculation and gambling of 1919-1921, namely, that, however great the demand, profitable and successful trading can only be conducted proportionately to the amount of cash or sound credit available. Printing presses, working overtime on paper notes, are to stave off liquidation, a disastrous method of raising credit, and sooner or later lead to commercial chaos and bankruptcy.

"The reconstruction of Europe—many of whose nations were our largest customers in pre-war days—is all important to Great Britain as an exporting nation, and no opportunity on the part of such solvent countries as Great Britain and America to assist in reconstruction on sound lines to the extent of such finance as can be safely extended should be missed, but the greatest and most enduring assistance will be in the direction of encouraging poor nations to help themselves. Nations whose currencies have fallen so low as to have little or no purchasing values will require to go hungry until they reorganize their internal economies and industries by producing and taking out of the ground the equivalent of currency to balance imports by exports.

"For an example of this theory one has only to study what has already been achieved by such a small country

as Czecho-Slovakia where determination, energy, and level-headed administration by shrewd commercial brains have placed her and her credit in a position to-day which must be the envy of other nations with far greater national resources and opportunities. Such a policy is the only permanent and reliable method of stabilizing exchanges. Export credits and other schemes introduced for the establishment of trade on long-deferred credits are only lending encouragement to European countries to rush into debt for goods they cannot pay for.

"It may be said that this doctrine carries little encouragement towards a speedy revival of trade in Great Britain, which lives to a very large extent upon her exports. True, but the obvious reply is that in our present state of reduced circumstances we must not trade beyond our means and cannot afford, however driven, to give unlimited or hazardous credit. We shall retrieve our own prosperity more quickly and surely by concentrated development of trade within the Empire, adding such outside business as exhibits a fair commercial risk, rather than retard reconstruction on normal lines by the encouragement of trading with insolvent nations against phantom credits which contribute to extravagance, indolence, thriftlessness, and inefficiency.

"America has recovered from the general depression to a greater degree than any other nation because about 80 per cent of her trade is within her own boundaries, because she has nursed and protected her industries, and consequently acts as a potent stimulant to production and employment.

"Prior to the war Great Britain was increasingly living as merchants for the distribution of the products of other nations. The aftermath of war has enormously extended capacity in almost every class of manufacturing equipment, and past conditions have been completely altered by similar extensions in other countries. In the peacetime war for commercial supremacy there will be no room for middlemen. Let us make certain that we do not drift into a position of being neither producers nor merchants.

#### A GRADUAL, NOT SPASMODIC, RECOVERY

"Best interests will be served by a trade recovery that is gradual and not spasmodic. The interregnum of restricted trade should be utilized to the fullest extent in perfecting plant, processes, and production efficiencies for all classes of manufactures for which the country is advantageously placed. Chemicals and dyestuffs with unlimited sources of coal and coal-tar products, limestone, salt, etc., should form two of the most extensive. When reconstruction and re-establishment of confidence bring demand we should then be in a position to command a fair share of the world's trade against any fair competition.

"I cannot close without drawing attention to two fundamental services which go to the very root of cheap production, viz., cheap coal and cheap transport.

"Coal is a national asset, and consumers have a right to demand that home requirements will be served first,

and, further, that industrial demands at least will have supplies at minimum prices and never higher at the pit mouth than those prices which are accepted in the same position for export.

"Railway rates, coastwise traffic rates, and overseas freights are still in excess of what they should be, and unless they are materially reduced will certainly operate very adversely against British industrial development.

"Consultation between manufacturers and close co-operation between employers and employed should be encouraged to the utmost, with the object of obtaining maximum output, from a minimum plant, at minimum cost, and also that we may compete for world trade more collectively as a nation and less as isolated members, with common interests."

## German Dye Offerings Fail to Influence Italian Dye Markets, Well Supplied Under Government Regulation

Shares in Domestic Dye Works Rise Slightly on Enforcement of Import Regulations—False Rumors of Bank Troubles Check Upward Trend in Italian Exchange Values—Demand for Colors Remains Limited Owing to General Money Tightness

By RAFFAELE SANSONE

Genoa, January 7, 1922.  
Special to The REPORTER

THE low quotations on dyestuffs offered by Germany wrought little or no change in the prices prevailing in the Italian market during the past month, owing to the abundant stocks still available, to the production of still more dyestuffs by the domestic works, and to the colors imported from Germany under the Reparations Clause of the Peace Treaty. The demand, however, remained very limited because of the great scarcity of money, which reduced the buying capacity of the Italian consumers and caused them to practise unwonted economies in all articles of clothing.

Many were led to anticipate a sudden rise in Italian exchange values on the strength of a slight rally during the month which brought the United States dollar from a value of 24.50 lire to 21.70 lire, and the English pound from a value of 98.30 to 90.30 lire. They were doomed to disappointment, however, for the rise turned out to be no more than a flurry and had been caused by a momentary suspension of importations. When the latter were resumed and a near panic was created by rumors of an impending general financial crisis in all Italian banks—which proved to be groundless!—all foreign exchange values regained the lost ground and established themselves at former levels.

Because of a continued strict enforcement of the

TABLE I

	December 31 (lire)	December 1 (dollars)	December 15 (dollars)	December 31 (dollars)
Naphthol Yellow .....	50,000—70,000	2,040—2,857	2,304—3,226	2,083—2,916
Auramine .....	70,000—80,000	2,857—3,265	3,226—3,226	2,916—3,333
Orange II .....	30,000—35,000	1,224—1,428	1,382—1,613	1,250—1,458
Nigrosine, water soluble.....	30,000—40,000	1,224—1,632	1,382—1,843	1,250—1,666
Nigrosine, soluble in spirit.....	35,000—40,000	1,428—1,632	1,613—1,843	1,458—1,666
Sulphur Black .....	7,000—10,000	285—408	322—460	291—416
Acid Black .....	35,000—40,000	1,428—1,632	1,613—1,843	1,458—1,666
Direct Black .....	35,000—40,000	1,428—1,632	1,613—1,843	1,458—1,666
Chrome Black .....	40,000—45,000	1,632—1,826	1,843—2,073	1,666—1,875
Methylene Blue .....	80,000—100,000	3,265—4,080	3,686—4,608	3,333—4,166
Direct Blue .....	25,000—30,000	1,020—1,224	1,152—1,382	1,041—1,250
Sulphur Blue .....	45,000—50,000	1,836—2,040	2,073—2,304	1,875—2,083
Malachite Green .....	80,000—100,000	3,265—4,080	3,686—4,608	3,333—4,166
Acid Green .....	60,000—70,000	2,448—2,857	2,765—3,226	2,500—2,916
Direct Green .....	50,000—70,000	2,040—2,857	2,304—3,226	2,083—2,916
Bismarck Brown .....	40,000—50,000	1,632—2,040	1,843—2,304	1,666—2,083
Magenta (fuchsine) Crystals .....	70,000—80,000	2,857—3,265	3,226—3,686	2,916—3,333
Ponceaux .....	35,000—45,000	1,428—1,836	1,613—2,073	1,458—1,875
Methyl Violet .....	70,000—80,000	2,857—3,265	3,226—3,686	2,916—3,333



TABLE II

	—December 1—		—January 5—	
	(lire)	(dollars)	(lire)	(dollars)
Acetate of alumina.....	1,600	65	1,600	66
Chrome alum .....	3,000	122	3,000	125
Bichromate of potash.....	6,000	244	6,000	250
Ferrous sulphate .....	500	20	500	21
Copper sulphate .....	2,450	100	2,450	102
Tartar emetic .....	12,000	489	12,000	500
Aniline oil .....	15,000	612	15,000	625
White refined glycerine.....	9,000	366	9,500	400
Glucose, 45 deg. Be.....	3,900	159	4,200	175
Hydrogen peroxide .....	2,100	85	2,100	87
Tannic acid, 60 per cent.....	20,000	816	20,000	833
Tartaric acid, crystals.....	10,750	438	10,750	443
Acetic acid, 30 per cent.....	2,500	102	2,500	104
Hydrochloric acid, 20-21 deg. Be.....	320	13	320	13
Formic acid .....	11,000	450	11,000	458
Lactic acid, 80 per cent.....	4,000	163	4,000	166
Alum .....	1,100	44	1,100	45
Ammonia, 22 deg. Be.....	1,550	63	1,550	64
Bisulphite of soda, 32 deg. Be.....	400	16	500	21
Chlorate of potash.....	3,600	146	3,400	141
Chloride of ammonia.....	4,500	183	5,000	208

dye import prohibitions by the Government, and the resulting broadening of the domestic sales field, the Italian dye plants were able to improve their position, and their shares rose slightly in value.

#### IMPORTS AND EXPORTS OF COLORED GOODS

The difficult moments through which Italy passed during 1921 caused the exportations of colored goods of all sorts to rise much above the importations, as can be seen from the figures given below, which relate to the first six months of that year. From them an idea of the initiative of the different Italian dye and print works can also be gathered.

	Imports (tons)	Exports (tons)
Colored hemp fabrics.....	6	10
Printed hemp and linen fabrics.....	2	5
Dyed cotton yarns.....	18	879
Dyed cotton cloth.....	302	12,052
Printed cotton cloth.....	349	1,463
Dyed loose wools.....	442	....
Dyed woolen yarns.....	4	26
Dyed woolen cloth.....	712	2,171
Printed woolen cloth.....	9	37
Dyed thrown silk.....	33	25
Dyed waste silk yarns.....	9	250
Dyed artificial silk.....	5	16
Dyed silk fabrics.....	40	327
Dyed half-silk fabrics.....	7	252

#### PRICES OF COAL-TAR DYES

The quotations in Table I per ton in lire and dollars

show the difference brought about by the United States exchange prevailing at the beginning of December, towards its middle and at its end.

#### MORDANTS, ASSISTANTS, DYEHOUSE PRODUCTS

Although the demand for such products was strongly reduced during December, owing to the feasts and to the end of the year, very few prices fell, there being a marked tendency towards the rise of others. Some of the changes in lire and dollars per ton are indicated in Table II.

#### REPORTED REMEDY AGAINST DAMAGE DONE BY MOTHS IN WOOL TEXTILES

By U. S. Consul Wallace J. Young  
*Bradford, England*

The monthly journal of the Chamber of Commerce of Huddersfield, England, for August quotes the following article on the above subject from the "Borsen Courier" of June 8, 1921:

"Under the name of 'Eulan' a new production of the German chemical industry has been placed on the market, for the explanation of which Dr. Meckbach delivered a scientific lecture, illustrated by film, in Berlin.

"After six years' work, founded on careful study, the dye works, formerly Friedrich Bayer & Co., Leverkusen, near Cologne, succeeded in discovering a process for the manufacture of mothproof wool. Great interest is shown in scientific and industrial circles in this invention, as it denotes a final victory over the clothes moth. The lecturer described the entire preparatory work that led to the invention. It was neces-

sary, in the first place, to study closely the zoology of the moth, especially three of the species, of which the clothes moth is the most dangerous, while the fur and wall-paper moth takes a second and third place.

"It was formerly asserted that wool interspersed with green dye was not eaten by moths. The experiment in Leverkusen contradicted this; it was discovered, on the contrary, that moths avoided a certain yellow dye known in chemical science as 'Martius Yellow.' But the question is not merely that of producing dyestuffs injurious to moths, as through the introduction of really poisonous dyestuffs the wool would be deprived of its entire beauty, and possibly be harmful to the wearer from a hygienic point of view.

"However high this new invention may be valued, some time will elapse before the general public can derive practical benefit from it. Immense quantities of wool, without any claim to being mothproof, lie in Germany, and how much care is expended on its preservation in the house and family! It will be well, therefore, not to entertain a too optimistic view regarding the future of 'Eulan,' but continue to wage war against the moth in the old approved manner."

#### **BRADFORD WEBSTER ADJUDGED INSANE**

##### **Former Head of Dye Exchange Corp. Believed Himself Sought in Connection with Wall St. Explosion**

Following his arrest on a charge of sending threatening letters to Chief William J. Burns, of the U. S. Department of Justice, Bradford Webster, once well-known New York lawyer and former dyestuff agent, was last week adjudged insane by Dr. M. S. Gregory, head of the psychopathic ward at Bellevue Hospital. The psychiatrist reported his findings to Maxwell S. Mattuck, Assistant United States Attorney, who has been investigating the charges against Mr. Webster. The letters were said to be the result of a hallucination that Chief Burns was hounding the latter in an endeavor to obtain from him information concerning the Wall Street bomb explosion. Dr. Gregory gave as his opinion that Mr. Webster should not be at large, and found him suffering from "innumerable delusions, mostly of a persecutory nature, and all of which are unsound, foolish and of a fantastic nature."

Mr. Mattuck went before Judge John C. Knox, of the United States District Court, and suggested that on the strength of this report the charges against Mr. Webster be dropped. Judge Knox ordered that this be done with the understanding that Mr. Webster be turned over to the State authorities and placed by them in some asylum for the demented.

Mr. Webster came to New York some years ago from Waterbury, Conn., and developed a wide law practice. For some time he conducted the Dye Exchange Corporation, and in this way become known in the industry. Expressions of regret at his reported infirmity have been offered by numerous friends and acquaintances of Mr. Webster, and to these *The Reporter* herewith adds its own, accompanied by a sincere wish for his recovery.

#### **DYES DISTRIBUTING CORP. REPRESENTING CINCINNATI, CIBA, GEIGY AND SANDOZ IN WEST**

Announcement has been made by the Dyes Distributing Corporation, 227-223 West Huron Street, Chicago, Ill., to the effect that since January 1 this firm, by appointment, has been selling agent for the Western territory of the Cincinnati Chemical Works, Inc.; the Ciba Company, Inc.; the Geigy Company, Inc., and the Sandoz Chemical Works, Inc.

The corporation states that it is in a position to offer the large and complete lines of domestic and imported dyestuffs and chemicals of these companies from stocks carried in Chicago, Ill.; Cincinnati, Ohio; Portland, Ore.; San Francisco, Cal., and Los Angeles, Cal. Numerous well equipped laboratories enable consumers to obtain prompt and efficient service. J. B. Jones is president of the firm.

#### **JOHN CAMPBELL & CO. PRODUCING PAPER YELLOW NFA ON LARGE SCALE**

John Campbell & Co., 75 Hudson Street, New York City, have sent out to the trade dyed samples of paper stock illustrating the use of this company's Paper Yellow NFA. The sample in question was prepared—on a basis of 1,000 pounds of dry stock—with ten pounds of Paper Yellow NFA seventy-five pounds of salt, and twenty-five pounds of soda ash. The ingredients were heated to 140 deg and run in the beater for thirty minutes.

The company announces that it is manufacturing Paper Yellow NFA on a large scale and is, therefore, in a position to furnish excellent quality at an attractive price. This color can be used for delicate tints, including buff, amber, golden rod, etc., and product samples, price and other information may be obtained by addressing the company's office.

#### **REPARATIONS COMMISSION ASKS U. S. STATE DEPT. TO DECIDE ON UNOFFICIAL AGENTS FOR AMERICA'S DYE SHARE**

The Allied Reparations Commission has decided, according to an Associated Press dispatch, to cable to the American Government, through Roland W. Boyden, American unofficial representative on the Commission, to determine whether the Textile Alliance or the so-called minority dye interests are to be recognized by the Commission as the unofficial American medium for the delivery of the American shares of German dyes.

The Alliance, which for several years has been the unofficial American agent, ceased to continue in that capacity after last December 14, following a decision by the Department of State.

The American dye interests outside of the Alliance, and especially agents of the dye interests, have been making a fight before the Commission to obtain a portion of the American allotment of German dyes, which amounts to nearly \$2,000,000 annually.





## MEN OF MARK in the DYESTUFF FIELD

**PERCIVAL J. WOOD**

Vice-President and  
General Manager

**Oriental Silk Printing Co.**

Haledon, N. J.

**P**ERCIVAL J. WOOD was born June 21, 1880, in Leeds, England, and received his preliminary education at the Leeds Boys' Modern School, entering in 1888 and leaving in 1895 to enter the University of Leeds. Here he took the full course in Dyeing and Tinctorial Chemistry, and on graduating in 1898 began his apprenticeship with William Grandage & Co., the Brownroyd Dyeworks, Bradford, which is now a branch of the Bradford Dyers' Association.

In 1901 he became Assistant Lecturer and Demonstrator of Practical Dyeing at the University of Leeds, in which post he spent the next two years, leaving in 1903 to come to this country, where he accepted the position of Chief Chemist to the American Silk Dyeing & Finishing Company, Hawthorne, N. J. In 1906 he transferred his activities to the Peerless Finishing Company, Nyack, N. Y., of which he was Assistant Superintendent until 1908.

It was in the latter year that he formed his connection with the Oriental Silk Printing Company, assuming the position of Superintendent and Colorist in the works at Paterson, N. J. Three years later, in 1911, he was offered the dual responsibilities of Treasurer and General Manager, and in 1913 he assumed the duties of Vice President and General Manager, which positions he occupies to-day.

## **S. O. C. M. ASSN. FINDS RETAIL MERCHANTS WILLING TO ELIMINATE MISLEAD- ING DYE LABELS**

### **May Co-operate with Laundry Owners to Bring About Further Clearing Up of Public Opinion**

The regular monthly meeting of the Dyestuffs Section of the Synthetic Organic Chemical Manufacturers' Association was held January 20 in the rooms of the Association, 1 Madison Avenue, New York City. Very satisfactory reports were received concerning the elimination by retail merchants of labels on dyed materials bearing statements calculated to throw doubt into the minds of customers regarding the reliability of American dyes.

In connection with this general subject, an interesting discussion was held on the details of a proposed co-operative work with the National Laundry Owners' Association whereby it is believed that a further clearing up of public opinion concerning American dyes will result. This movement is somewhat along the lines now being so successfully followed by the National Council on Colors and Dyes, which organization has already done effective work in clearing up certain disputed points, and in proving that American dyes are now available to meet the most drastic requirements of the consuming trade.

A report was made of active progress by the committee appointed at the last general meeting of the association on the definition of the term "synthetic organic chemical," this definition having unusual importance because of its bearing on the membership of the association and also on the administration of Title V of the emergency tariff act. The report of this committee will be forwarded to the proper officials of the Treasury Department.

The members of the section reported receipt of the questionnaires from the Tariff Commission for the forthcoming census for 1921. The manufacturers are now engaged in compiling this information for prompt return to the Tariff Commission.

The general consensus of opinion of those present indicated that while business conditions are fairly active in certain lines, nevertheless the industry must wait upon the enactment of definite tariff legislation before attempting an intensified development policy.

[Note—Seizing the opportunity provided by the above account to respond to the many inquiries recently directed at this office concerning the present status of the American Dyes Institute, it may be said that the latter organization has been preserved intact and is functioning as heretofore, and that many members of one body are also members of the other.—Ed.]

At the annual meeting of the stockholders of the Monsanto Chemical Works, St. Louis, Mo., held at the main office January 16, the following directors were elected: John F. Queeny, Gaston Du Bois, Theodore properties, and is valuable for dyeing in combination

John R. Goodall. At the annual directors' meeting, held on the same date, the following officers were elected to serve during the ensuing year: Chairman of the board, John F. Queeny; president, Gaston Du Bois; vice-president, H. O. McDonough; treasurer, W. R. Phemister; secretary, Edgar M. Queeny; assistant secretary, C. A. Zacher.

## **NATIONAL QUINOLINE YELLOW AND NA- TIONAL WOOL GREEN S ARE PLACED ON MARKET**

The National Aniline & Chemical Company announces placing on the market two new products, National Quinoline Yellow and National Wool Green S, product samples and dyeings from which will be furnished upon application to the company's main office, 21 Burling Slip, New York City, or any of its branches.

National Quinoline Yellow is the most recent addition to the line of acid dyes manufactured by the company, and is in all respects equal to the Quinoline or Chinoline Yellows that have been familiar to the dyestuff trade for many years. This product yields very bright, greenish shades of yellow on silk or wool. It is readily soluble, possesses excellent level dyeing properties, and is valuable for dyeing in combination as well as self-shades. It is not dischargeable with hydrosulphite, and therefore should be of especial interest to the printer making color discharges.

National Wool Green S should be of value to dyers of piece goods. It possesses excellent solubility, dyes level, and exhausts well from the dye bath. It possesses good fastness to perspiration and organic acids, as well as to washing, fulling and carbonizing. It is particularly serviceable for producing mode shades in combination with other level dyeing "National" acid dyes. For shading purposes it may be added with safety to the boiling dye baths. It is recommended for dyeing worsted and woolen dress goods and yarns, and for either wool or fur felt. The general utility of this new product is indicated by the fact that the dyer of silk may employ it on either weighted or unweighted silk. It is also extensively used for dyeing carpet yarns. After-treatment with bichromate somewhat improves its fastness to light and washing without materially altering the shades.

## **"G. E. T." NOW WITH BROOK WOOLEN CO., ONTARIO**

Readers of The REPORTER will probably be interested to learn that George E. Templeton, owner of the familiar "G. E. T." signature of the late "Dye-A-Grams" column, and occasional contributor of more serious matter in the form of technical articles, has severed all connection with the Brown Woolen Mills, with which he was formerly identified, to become superintendent of dyeing and finishing for the Brook Woolen Company, Ltd., Simcoe, Ontario.

This firm, which specializes on the manufacture of horse clothing, traveling rugs, bed blankets and mack-



inaws, but has of late added various woolen dress goods to its line, has recently completed a new concrete dye and finishing house, 150 x 130, equipped with James Hunter Machine Company type kettles. There is a complete and up-to-date laboratory, and Mr. Templeton reports the plant to be running full time, with occasional overtime, which is exceptional in view of present conditions in the textile industry of Canada. The REPORTER takes this opportunity of wishing him success in his new connection.

#### **N. Y. ARCHITECTURAL LEAGUE EXHIBIT WILL SHOW USE OF AMERICAN DYES FOR INTERIOR DECORATION**

The annual exhibition of the Architectural League of New York takes place this year in the Fine Arts Building, at 215 West Fifty-seventh Street, that city. The opening ceremonies will be held Friday, February 3, at 9 p. m., and the reception will take place Saturday, February 4, from 3 to 6 p. m.

There will be a public exhibition commencing on Sunday, February 5, and lasting until March 4, inclusive. Hours will be from 10 a. m. to 6 p. m. and from 8 p. m. to 10.30 p. m.; Sundays, from 1 p. m. to 6 p. m.

Admission will be 50 cents, except on Mondays, which is a free day.

The exhibit this year will include drawings and models of proposed and executed work, both in architecture and the allied arts; also, specimens of decorative painting, furniture, metal work and ceramics. A particular feature will be the application of American-made dyestuffs to interior decoration.

#### **SCOTTISH WOOL DELEGATION UNIQUE IN BRITISH TRADE ANNALS**

Two years ago, to counteract the mischief which was being done to the age-long traditional reputation of Scottish woollens by the flooding of the world's markets with cloth purporting to be Scotch tweed but for the most part neither made in Scotland nor consisting of pure virgin wool, but composed largely of shoddy, frequently adulterated with cotton, the Scottish woolen manufacturers applied to the British Government Board of Trade for a collective national trade-mark for the identification of genuine Scottish woollens. The Board of Trade granted the use of such a mark, guaranteeing the cloth upon which the mark is stamped as "Made in Scotland of Pure New Wool," at the same time laying down stringent regulations as to its use.

The Scottish manufacturers formed an association, "The Scottish Woollen Trade Mark Association," for the purpose of administering and giving publicity to the national trade-mark, and this organization, as will be remembered, decided to send a representative official delegation to the United States and Canada to investigate the North American market and to study the best methods of developing there the demand for genuine Scottish woollens. It is believed that this is

the first occasion on which an official delegation has been sent from England overseas in the interests of a representative national industry.

The visiting delegation consists of about twenty members, representing about one-half of the entire output of Scottish woollens. Many of the members of the delegation bear names which have been identified for generations with the traditional tweed industry of the Scottish border.

The delegation sailed from Liverpool for New York on December 31. It has visited New York, Washington, Philadelphia, Boston, Montreal, Toronto and Hamilton, and its subsequent itinerary will be as follows: Buffalo, January 31; Rochester, February 1, Cleveland, February 2, and Chicago, February 9.

#### **NOTES OF THE TRADE**

Under the laws of New York the Thompson Chemical Company has been incorporated with a capital of \$1,000,000 to manufacture chemicals. The incorporator is the United States Corporation Company.

Herman A. Metz, head of the chemical and dyestuff house which bears his name, has been appointed by Governor Miller of New York as a member of the commission to revise the State charter.

The American Fabric Company, Providence, R. I., formerly at 690 North Main Street, has been incorporated and removed to 289 Thurber's Avenue. Jacob Kermer is president.

The Improved Shuttle Company, 10 Arlington Street, Paterson, N. J., has been formed to manufacture a safety lock shuttle for use on ribbon looms. The device prevents the quill spindle from jumping out of the shuttle, thereby preventing smashes from this cause. The members of the company are Gottlieb B. Wilms, of Paterson, and John H. Steiger, of Allentown, Pa.

The Harkins-Hammack-Whitlock Company, Hendersonville, N. C., has ordered architects to prepare plans and specifications for the erection of a building to be equipped for manufacturing hosiery.

The Corona Chemical Company, 16 East Fortieth Street, New York, has filed notice of increase in capital from \$25,000 to \$500,000.

H. Carroll Brook, secretary and treasurer of the Edgewater Dyeing & Finishing Company, Philadelphia, Pa., has been elected president of the Board of Commissioners of Cheltenham Township.

The Calexico Cotton Products, Inc., Calexico, Cal., has been incorporated to deal in and manufacture cotton and textiles. Capital, \$50,000; shares, 500 at \$100 each, of which \$30,000 has already been subscribed.

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

S. D. M. Co.—*Question*: We have tried many recipes for sizing coarse twines of hemp, jute, etc., but all lack luster. What particular materials are commonly used in these mixtures to produce the luster? What part do friction and heat play?

*Answer*: A common and satisfactory size is made up as follows: Corn starch, 60 pounds; sulphate of alum, 2½ pounds; formaldehyde, 1 pint; water to total 60 gallons.

The ingredients are mixed cold into a milk. This is then brought to a boil with live steam (fifteen minutes) and cooked fifteen minutes longer to give a uniform mixture. It should be agitated while cooking.

It is often found advantageous to use Japan wax, tapioca and soluble oils in conjunction with the above formula, depending on the twine. A rough, hairy twine requires a size that will lay the hair. Tapioca helps in this respect. The wax and oil varies the degree of softness of the twine.

The heat required depends on the surface contact the twine makes with the drying cylinder. Generally 150 deg. Fahr. is the temperature of the drying cylinder. The twine should not be taken off too dry, as a brittle twine results. Friction plays a very important part in the polishing of twines. A too heavy pressure will scrub the twine and ruin the finish, especially if the twine has become dry before leaving the machine. A brisk, gentle rubbing gives the best results, while the heat should be so regulated that the twine is barely dry when leaving the machine.

A very good twine and a very poor twine may be produced with the same size, depending upon conditions in the polishing machine. If properly handled on the machine, the above size should give a very satisfactory and durable luster.

H. S. Co.—*Question*: We are occasionally called upon to redye faded woolen garments. In many instances the results are most unsatisfactory in that the faded portions

come out quite a different shade from the unfaded portions. Can you give us any suggestions?

*Answer*: There are two methods which we believe will overcome your difficulty.

The first is to bleach the material, prior to dyeing, in a bleach bath made in the following manner: Two per cent of soluble oil is weighed off into a pail, 1 per cent of sodium peroxide is then added, and this is then added to the bath in which the material has been wet out. The temperature should be lukewarm and gradually increased to a boil; boiling is then continued for about thirty to forty-five minutes. This will usually bleach the material sufficiently so that it is entirely level. The dyeing can then be accomplished.

The second method is to give the material a light chroming. About 2 per cent of chrome and 3 per cent of acetic acid is used; the material is boiled forty-five minutes to one hour, and then dyed. The percentage is figured on the weight of the material.

In order to get the best results it is usually necessary to redye in heavy shades only. Unless the material has been very badly faded, either of the methods above will generally be found satisfactory, although in some cases the prolonged action of sunlight will be found to have affected the chemical structure of the wool fibers so that no treatment will entirely restore their natural affinity for the dye.

L. P. J.—*Question*: Is there any way that hydrosulphites can be used for cleaning the hands when stained by dyes?

*Answer*: As all the hydrosulphites are only effective at temperatures near boiling, it has so far not been possible to utilize them for such a purpose. Chloride of lime and soda remain the best things we know of.

R. B. N.—*Question*: I am using an after-chromed black on wool shoddy, dyed in an open kettle. The laboratory dyeings are of good shade and fast, but the practical work always comes out reddish and will not stand fulling. How can I correct this?

*Answer*: In your laboratory dyeing you probably are able to dye the material evenly and chrome it uniformly, so that all the black is changed into the dark and fast color, as it should be. When you work in an open kettle, poled by hand, it is not so easy to get the chrome distributed before it has acted on the black. The result is that some portions are overchromed and become rusty, while other parts, not being acted on by the chrome, still retain the red shade of the unchromed black. If you cannot install a stock-dyeing machine for this work you will have to take more time and add the chrome over a longer period of time while poling, so as to distribute it more evenly.



## Review of Recent Literature

*Cotton Facts*; 1921 Edition, flexible binding. New York, Shepperson Publishing Company, Inc.

This book covers thoroughly every branch of the business, from the production and marketing of cotton to its manufacture and distribution. It gives the latest figures from official and other reliable sources concerning the acreage and yield of cotton, its condition during various periods of its growth, the surrounding climatic conditions affecting its growth at different points in its maturity, and the date of harvesting, all covering a series of years; facts and figures concerning the world's movement of cotton, exports, imports, amounts of sales, values, market fluctuations, prices, distribution and consumption, covering in detail a series of years, making the work invaluable to merchants, brokers and shippers interested in market statistics. It has been thoroughly revised and enlarged in many important particulars, viz.: Comparative statistics on killing frosts, seasons 1919-20 with 1920-21; the extension of statistics on ginning to specified dates to cover a period of ten years back; exports from Egypt; world's invisible supply, carry-over, supply at close of season, weekly sales at Liverpool, Japanese consumption; consumption by world's spindles; exports of cloth and yarns from United States; Japanese yarn exports; extension of table on sales of print cloth; trade in foreign countries (manufactures); cottonseed exports; with additional material on the products of cotton and cottonseed oil meal.

*Thin Boiling Starches*. George E. Chamberlain; "Cotton," January, 1922; p. 172.

Author declares that one of the important steps forward in the manufacture of cotton fabrics has been the introduction of properly prepared thin boiling starches, and cites the difficulties in securing these in days gone by. He states that under modern methods these difficulties have been eliminated and a thin boiling starch is now produced which is entirely satisfactory. A description of the manufacture follows, which is succeeded in turn by a discussion of application methods for securing the best results, one of which is a great reduction in attrition on the warp. This is a common source of loss when ordinary pearl starch is used, because of the latter's failure to penetrate and thoroughly saturate the yarn. When the fibers which constitute a strand of yarn do not adhere closely together, they protrude and are broken off, but by the use of thin boiling starch the fibers are cemented more closely together, and tests by actual weight have, it is declared, demonstrated an average decrease in shedding.

The writer also finds that because of the ability of a thin boiling starch to bind the fibers together into one compact body, the strength of the yarn is very materially increased. Tests have shown this increase to be from 12 to 15 per cent.

Under normal conditions, the greater the strength, and the greater the elasticity, the smaller the number of breaks, and breaks make seconds; so that an increase of strength in the warp of 12 to 15 per cent makes quite a remarkable decrease in the amount of seconds produced by the loom.

Looked at in another way, the use of thin boiling starch in the slasher box will make a short fibered cotton as strong as those spun from longer fiber. Also, because of its penetration, it does not dry with a hard, brittle crust on the surface of the yarn, as does ordinary pearl starch, but instead dries into a flexible finish which gives a "soft, pleasant" feel to the finished goods. These numerous advantages are particularly apparent in the manufacture of print and similar goods, and in heavier weaves the advantages persist but to a lesser degree.

Author concludes that by using well-made thin boiling starches: First, one decreases shedding 50 per cent; second, increases the strength of the yarn 12 to 15 per cent; third, decreases breakage 50 to 75 per cent; fourth, decreases production of seconds in proportion; fifth, gives a soft, agreeable finish to the goods.

*Dress, Blouse and Costume Cloths*. Roberts Beaumont and Walter George Hill. London.

The treatment of textile manufacture from the standpoint of the commercial uses of the fabrics is of real value, and this discussion of the design and manufacture of dress, blouse and costume cloths is a most comprehensive one. The authors have attempted to interpret the commercial and industrial aspects of the trade; the nature, structure and qualities of the yarns employed; the weaving principles involved; the design and color schemes elaborated, and the systems of fabric construction and manufacture practised. Technical and working data are supplied on the manufacture of each standard class of dress fabric in cotton, silk, wool, linen, canvas, etc., and of the many varieties of fancy fabrics.

After a general discussion analyzing the industrial range, the following subjects are discussed in the succeeding chapters: The Yarn Unit; Silk—Thrown, Spun and Artificial; The Yarn Unit Applied; Weave Elements and Cloth Construction; Drafted Patterns—Stripes; Geometric Design Bases—Weave Compounds; Spotted and Mosaic Patterns; Practice in Figure Designing; Pile, Pappet and Gauze Structures.

The utility and function of color in the various classes of dress fabrics are illustrated and defined.

Announcement has been made by the Prospect Dye Works, Brooklyn, N. Y., to the effect that the capital of this firm has been increased from \$12,000 to \$30,000.

## Recent Patents

### Production of Cellulose from Vegetable Matter

(1,402,210; January 3, 1922)

GONZALO JOSE BUSTAMONTE

This describes the process of obtaining cellulose from vegetable matter, which consists in immersing the vegetable matter to be treated in cold water; separating it into coarse fibers; depositing the fibers in a receptacle containing anhydrous lime; successively supplying a cold alkaline solution and a solution of volatile alkali to said receptacle; successively acidulating the bath thus formed with hydrochloric and sulphuric acids; thereafter washing the fibers with cold water; and finally comminuting said fibers.

### Treatment of Cellulose or Materials Containing Cellulose

(1,402,201; January 3, 1922)

MATTHEW ATKINSON ADAM

Claim is granted, in a process of treating woody matter in a finely subdivided form, the steps which consist in forming thereof a fluent pulp with an added chemical solution, and then subjecting the said pulp in a continuous stream of digestion under heat and pressure.

### Chromium Compounds of Azo Dyestuffs

(1,402,350; January 3, 1922)

JOSEPH GRIMMER and FRITZ STRAUB (assignors to Society of Chemical Industry in Basle, Basle, Switzerland)

Patentee describes new chromium compounds resulting from the treatment of the new mordant dyeing dyestuff of the general formula  $R-N=N-R'$  (wherein  $R-N=N-$  signifies a 1-diazo-2-oxynaphthalene-4-sulphonic compound and  $R'$  a halogenated alphanaphthol) with an agent yielding chromium, which constitute dark powders soluble in water with blue to greenish-black and in concentrated sulphuric acid with greenish-blue to violet colorations and dye wool, when dyed according to the manner usually employed for acid dyestuffs, very equal and very fast blue to gray tints.

### Method of Coating Fabric with Vulcanizable Plastic Material

(1,402,288; January 3, 1922)

GEORGE F. FISHER (assignor to Revere Rubber Company, Providence, R. I.)

This is a continuous method of skim-coating both sides of fabric with relatively stiff and non-spreadable plastic which consists in continuously forming the plastic into continuous and unbroken films of the desired uniform thickness, and immediately feeding the films while free and unconfined to opposite sides of the fabric, and

continuously and simultaneously pressing the films onto the fabric at directly opposite points.

### Color Composition, and Process of Preparing Same

(1,402,442; January 3, 1922)

JOHN JERMAIN PORTER

This is a changeable color composition comprising a deliquescent color compound combined with a sufficient quantity of a dry absorptive diluent to hold the hygroscopic moisture absorbed by the color compound.

### Fabric Stripping Machine

(1,402,067; January 3, 1922)

CASSELL D. HIBBS

Description is given of a fabric stripping machine comprising a reel adaptable for holding tire casings of different diameters, a stripping shaft, means for positioning said shaft closer to or farther from said reel, and means for driving said stripping shaft.

### Drying and Shaping Structure for Drying Lace Hosiery

(1,402,532; January 3, 1922)

THOMAS F. O'CONNELL (assignor to Paramount Hosiery Form Drying Company, Chicago)

Patentee describes a hosiery drying and shaping form relatively thin in cross-section and having arc-shaped, fabric-flattening front and rear faces, the width dimensions of which vary intermediate the ends of the form, and having, also, oppositely-disposed crease-producing side edges, and including an elongated leg portion, a foot portion extending in longitudinal alinement therewith, and an integral heel section between the leg and foot portions and outstanding from the rear face thereof at the lower end of and as a continuation of the foot portion.

### Process of Bleaching Cotton

(1,402,040; January 3, 1922)

HARRY P. BASSETT

This is a process of bleaching cotton fibers which comprises hydrolyzing the typical gums and resins present in the fibers with an acid solution of not in excess of substantially  $1\frac{1}{2}$  per cent strength to form soluble sugars and organic acids, washing to remove the sugars and the soluble organic acids, treating with an alkaline solution of not in excess of substantially  $2\frac{1}{2}$  per cent strength to form salts of the organic acids, washing to remove the salts formed, and bleaching.

### Knitting Machine

(1,402,038; January 3, 1922)

GEORGE L. BALLARD (assignor to Wildman Manufacturing Company, Norristown, Pa.)

Claim is granted, in a knitting machine having spring beard needles, for a cylinder, a ring having a ledge and a rib overhanging the same and pressers individual to the



needles pivotally supported at their lower ends on the ledge and having movement at their upper ends to and from the needle beards, said pressers at their lower portions bearing upon the needle shanks and having shoulders engaging under the rib to be held in place thereby, said pressers being adapted to be removed by first removing the needles, thereby providing space to permit the displacement of the shoulders of the pressers from under the rib of the ring.

#### **Slicing Mechanism for Circular Knitting Machine**

(1,402,394; January 3, 1922)

GEORGE P. BOSWORTH and EUGENE M. GUNNING (assignors by mesne assignment to Hemphill Company, Central Falls, R. I.)

This consists, in combination, in a circular stocking knitting machine, with a main yarn feed finger, means for splicing an area less than the full circumference of the stocking, comprising a circle of needles, one-half of which are long butt instep needles and the other half of which are short butt heel and toe needles, all the long butt needles occupying one side of the needle circle and the short butt needles occupying the other side of the needle circle, a splicing yarn finger movable to and from feeding position, needle cams, and a central guard cam, the said central guard cam having cam surfaces for the short and long butt needles respectively for dividing the half-circle of long butt needles from the opposite half-circle of short butt needles to permit feeding the splicing yarn to the short butt needles only, which also take the main yarn, the said movable splicing yarn finger remaining in feeding position during round knitting and throughout the needle circle while the spliced area is being formed and thereafter being withdrawn, substantially as described.

#### **Thread Carrier Stop Mechanism for Circular Knitting Machines**

(1,402,033; January 3, 1922)

MELCHIOR ZWICKY (assignor to Textile Machine Works, Wyomissing, Pa.)

Description is given, in a full-fashioned knitting machine having thread-carrier rods and a narrowing screw; a stop-nut on said screw carrying a plurality of selectively usable stops for one rod each arranged to be moved into and out of end-abutting position.

#### **Tucking and Drop Stitch Mechanism for Knitting Machines**

(1,402,379; January 3, 1922)

FRANK W. ROBINSON (assignor to the Nolde & Horst Company, Reading, Pa.)

Patentee describes, in a knitting machine comprising needles having butts of different lengths and certain of the long and short butt needles provided with relatively

long latchers; main latch clearing cams adjustable to clear all of the needles or the short-latch needles only, and supplemental latch clearing cams effectively operative upon the shorter butt needles only.

#### **Coking Retort Oven**

(1,402,272; January 3, 1922)

JOSEPH VAN ACKEREN (assignor to the Koppers Company, Pittsburgh, Pa.)

This consists, in a coking retort oven, in combination; a plurality of coking chambers; heating walls contiguous to said coking chambers and respectively constituted of a series of combustion flues; regenerators located in planes below the planes of the coking chambers and the heating walls, said regenerators respectively having their checkerwork divided into a plurality of compartments, each one of which communicates individually with a group of combustion flues of a heating wall, and having a tunneled passageway interconnecting all the compartments of a like degree of remoteness, with respect to the side of the battery, of a plurality of regenerators; and means for separately controlling the flow in the interconnected series of compartments of a plurality of regenerators; substantially as specified.

#### **Regenerative Coke Oven**

(1,402,770; January 10, 1922)

JOHN E. HUBBELL (assignor by direct and mesne assignments of one-third to Louis Wilputte and two-thirds to Alice A. Wilputte, New Rochelle, N. Y.)

This consists of a coke oven having a series of horizontal coking chambers and a series of heating walls alternating with the coking chambers and each formed with a plurality of vertical heating flues connected at their upper ends and supporting walls beneath and parallel to the heating walls and walls transverse to the supporting walls dividing the space between each pair of supporting walls into a plurality of regenerating chambers separately connected to the lower ends of the flues in an adjacent heating wall and forming two sets, one at each side of a central flow reversal plane with the regenerators in each set all "on" or all "off" at the same time, the improvement which consists in separate conduit connections for groups of regenerators of each set located at different distances from said flow reversal plane, said conduit connections being parallel to and extending between said supporting walls.

#### **Warp Dyeing Machine**

(1,402,765; January 10, 1922)

WALTER F. HASKELL

This machine and its operation was fully described by Mr. Haskell in an article in *The Reporter* of November 7, 1921, page 33, which see.

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

FEBRUARY 13, 1922

NUMBER 4

## FEATURES OF THIS ISSUE

In the first instalment of "Modern Views on Soap," Charles F. Goldthwait discusses the changes which have taken place in former beliefs concerning soap solutions, and describes the modern theories in detail.

A method for estimating and controlling the strength of stock soap solutions is presented by H. W. Eastman in his fourth paper under the general heading, "Control of Bleach-House Processes."

Proceedings of the A. A. T. C. C. include an account of the Organization Meeting of the New York Section, the conclusion of the second Research Committee meeting, and the first instalment of a "Bibliography of Literature on the Fastness of Dyes" by Wallace J. Murray.

List of dyes licensed for January import by the U. S. Treasury Department.

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the Practical Application of Dyestuffs and the Mechanical Equipment Incidental Thereto

VOL. X

NEW YORK, FEBRUARY 13, 1922

Number 4

## Modern Views on Soap

### Part I

Action of Soaps as Colloids—"Sols," "Gels" and "Curds"—Cooling of Soap Solutions—Soaps as Emulsions—Peculiarities with Indicators—"Ionic Micelle"—Internal Structure in Soap Solutions—Motion in Soap Solutions—Fibrous Structure of Curds

By CHARLES F. GOLDTHWAIT

*Chemist, Klearflax Linen Rug Company, Duluth, Minn.*

IN spite of all the years since the first fat was made into a crude soap by the aid of wood ashes, soap is still very much a mystery. As with textile fibers and many other materials used in the industry, the men in the mill have been more successful, or at least much quicker, in working out the practical relations than the scientists have been in explaining them. We are now, however, well on the way toward understanding the "theory" of soaps and may soon expect the advances in practice that always follow a real understanding of the "why" of things.

Research workers in both England and America, some of them with eyes wide open to practical points, have already given us many interesting explanations of soap activity. Our purpose here is a brief review of the more recent publications, some of which are not very accessible, with the hope that it will add interest to the everyday use of soap in the mill and perhaps furnish useful suggestions.

The old idea of a soap solution has been very much changed. When an actual *neutral* soap is dissolved in water it has an *alkaline* reaction the same as a dilute solution of caustic or soda ash. This alkalinity, due to a very small amount of the soap going back by hydrolysis into fatty acid and free caustic, was formerly held to be responsible for a large part of the scouring and cleaning effect.

#### SOAPS ARE COLLOIDS

It has been found, however, that this is not a sufficient explanation, as a caustic solution of alkaline strength equal to the soap, or even stronger, while it has more cleaning action than water alone, does not have an effect nearly equal to that of soap.

The remarkable properties of soaps are, rather, to be

attributed to their action as colloids. This statement, however, is far from an explanation in spite of the fact that the mere characterization of a thing as colloidal has often served as a broad and complete explanation, ranking with "chemical affinity" as a convenient parry for a thrust at our ignorance. Now, however, we are describing and measuring the particles and the properties of colloidal systems, and soap is getting its full share of attention.

While in the past we were well satisfied with pure chemical explanation of things we now realize that in many cases physical properties are even more significant. Colloids are not a class of materials, but representatives of a state of matter; more specifically, matter in a finely divided condition. The large particles are just too small to be visible in the ordinary microscope, while the smaller approach closely to molecules in size. The action of soap, then, is not entirely chemical, but depends very largely on the properties of a mass of soap particles suspended in water, on the vast total of surface area of these particles, and on their union into more or less systematic "structures"; in other words, upon both chemical and physical properties.

An ordinary piece of soap has certain properties which we all know; if we cut it up as finely as possible it still has them. The pieces are smaller and their combined surface is larger, but there is no other change. However, if subjected to the action of an acid, for example, the reaction would be much more rapid with the fine soap than with the single piece. This illustrates in a crude way the colloidal state. If the subdivisions could be extended until we had an infinite number of pieces there would be still greater activity due to the still larger surface exposed. We finally reach a stage where fineness of particles and extension of surface have not only changed the intensity of a given reaction, but may have



given rise to quite new effects. Dissolving a soap in water has the effect of subdividing it into a vast number of particles, and it will be seen a little later that these behave in their own peculiar way, which is quite different from that of a soap merely chopped to extreme fineness.

Recent research on soaps has been conducted from somewhat different but related points of view. There has been work on the structure and composition of soap jellies and curds as well as solutions, other work on the nature of the ultimate particles of soap in these different states, and, finally, the establishment of connections between such data and the familiar washing and scouring operations. The discussion logically follows this order, and the numerous practical or semi-practical points brought out may serve as hints for operating efficiency.

Fischer's<sup>1</sup> new book gives a quite complete discussion of the general physical properties of soap solutions. Soaps are made of fats or oils of animal or vegetable origin, which, like all other products of nature, are not perfectly pure substances but vary with the geographic source and with the seasons. Most soaps are purposely made of mixtures of fats, and the fats are in their turn mixtures varying in the proportions of their normal fatty constituents as well as in the kinds and amounts of unsaponifiable matter, alcohols and other organic materials. One of the cardinal principles of such research is to start with pure materials so that one factor at a time can be changed or studied in the experiments. Such a method is manifestly very difficult with oils, fats or soaps which are mixtures of such similar materials very difficult to separate.

The recent investigators have, however, been able to use pure individual fatty acids for preparing their experimental soaps, so their results have a definite basis. Wherever possible, the conclusions are extended to embrace commercial soap mixtures.

The most common appearance of soap in solution is either a hot clear liquid or a stringy, usually white, gelatinous mass often approaching to or actually solid. The pure soaps used experimentally have the same general properties and the different solution states have been quite clearly described,<sup>2</sup> although there are no very definite boundaries between them.

#### "SOLS," "GELS" AND "CURDS"

A "soap sol" is a clear transparent liquid, but it usually contains a little sediment of solid soap, the result of the small but definite hydrolysis that is universally exhibited by all aqueous soap systems. Often at the lower temperatures the soap solution deposits the soap which is in excess of the solubility at the time.

A "soap gel" is a clear, transparent body which is identical with a "soap sol" in every respect except that it retains a definite form and possesses elasticity. Often

the gel is clouded by the formation of a few true curd fibers.

A "soap curd" is a white, more or less opaque, mass. It consists of innumerable curd fibers, enmeshed in which is a soap gel or sol. The concentration of the gel or sol depends upon the temperature and upon the nature of the soap, varying from very high concentrations to practically pure water, the latter being the case with the more insoluble soaps of the highest saturated fatty acids.

Finally, in the case of potassium soaps there may co-exist with one or more of the above systems transparent tubular crystals of hydrated potassium soap.

The above relationship has not hitherto been recognized nor described.<sup>2</sup>

#### WHEN SOAP IS COOLED

When ordinary soap is dissolved by heating in water, the result at any usual strength is a fairly clear solution or soap sol. As such a solution cools it sets to a solid gel, or tends to become "stringy," the soap frequently settling out from a clear liquid. If very dilute, however, the whole may remain as a clear liquid, a true solution of, say, sodium stearate, similar in all its properties to an equivalent solution of sodium acetate, which is not at all colloidal.

Fischer has devoted special attention to the cooling of soap solutions. When a soap sets to a *solid* on cooling, it has taken up or absorbed all the available water in the system. When there is a separation of soap within a clear aqueous liquid, the soap has absorbed only a limited amount of the water and the relative quantity is spoken of as the gelation capacity.

Three common fatty acids differ only by steps of two hydrogen atoms, but the amounts of water held per gram of dry soap vary in quite a different way:

Linolic ( $H_{31}$ )	3.31 grams
Oleic ( $H_{33}$ )	3.28 grams
Stearic ( $H_{35}$ )	88.00 grams

The last two are the more frequently used in textile work and are approximately represented by red oil and pure tallow soaps. The same thing can be expressed in the more practical way of per cent of soap required to yield the same colloidal system:

Linolic	23.20 per cent
Oleic	23.30 per cent
Stearic	1.12 per cent

The figures show at once that the two most common types are quite different and imply that it would be possible to use only one-twentieth as much of one as of the other. Such, of course, is not the case even with pure soaps, as other factors intervene when it comes to actual scouring. Of practical soaps, those nearest to oleic acid always contain some of the harder fats and those nearest to stearic contain lower fatty acids closely related to it,

<sup>1</sup> Fischer. "Soaps and Proteins." Wiley, 1921.

<sup>2</sup> Darke, McBain and Salmon. Proceedings of the Royal Society. March 3, 1921. "The Ultramicroscopic Structure of Soaps."

as well as some oleic acid. They not only would come closer together in the amounts required, if used for the same purpose, but practice as well as theory tells us that such soaps are best adapted to somewhat different uses. That stearic acid soaps are not so *especially* efficient is also confirmed by the fact that stearic acid alone does not make particularly good soap, and is not used as such, although it can be conveniently bought and can be made up as easily as red oil soap, which is widely used for scouring.

Since commercial soaps are mixtures, the next logical step was the testing of such mixtures, starting with those that could be accurately controlled in composition. As stearates alone hold relatively very much more water than oleates, the question naturally arose as to what would happen if equal amounts of two such soaps were to compete for a limited amount of water. This is of special interest, as it is just what happens when a commercial soap is dissolved.

Omitting experimental details, sodium stearate cooled from the boiling temperature turns solid; sodium oleate under the same conditions is a mobile liquid: but if oleic acid soap is added to stearic acid soap the effect is out of proportion to the amount added, and only thin mixtures result where a more solid state would be expected. Similar results were obtained with oleate added to palmitate and in other cases.

Finally, soaps representing mixtures of the lower molecular weight, eight carbon caprylic acid with the eighteen carbon stearic, both saturated acids, were included in the series and a similar result found, which, expressed as a general conclusion, is, "It is the soap with the lower absolute gelation capacity which gives the deciding character to the mixture."

Expressed in more practical terms, the naturally occurring fats of lower molecular weight and of the unsaturated series, present in a fat like tallow, tend to make a soap manufactured from it depart considerable from the characteristics of a soap made of pure stearic acid, and the soap will make thinner solutions than would be expected from the behavior of sodium stearate alone.

#### SOAPS AS EMULSIONS

While these phenomena may seem to have been allotted an undue amount of space, they lead directly to one of the most striking of the newer conceptions; namely, that soap solutions usually behave like water dissolved in soap, suspended in a solution of soap dissolved in water. This is most easily illustrated by the familiar behavior of ether in ordinary extractions of aqueous solutions. Water will dissolve some of the ether, while the ether will dissolve a little water. The two solutions will be quite different in properties, although consisting of the same ingredients. Another closely analogous case is that of phenol and water.

Fischer suggests that something very similar takes place with soap and water. Water will dissolve a certain amount of each kind of soap at the boil and form an ordinary appearing clear solution. This is a solution of

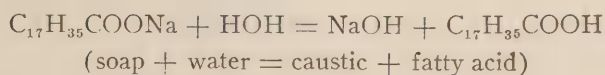
soap in water. If this cools and sets to a solid mass, it seems to approach more to the state of a solution of water in soap. At intermediate temperatures and strengths of solutions we have various mixtures of solvated soap in soap-in-water solution. It is the same thing that has been suggested for albumen. The apparent solution of albumen in water is really a complicated system consisting of a suspension of water in albumen or a hydrated albumen, in a weaker solution of albumen in water. Such a soap "structure" is in itself a sort of emulsion, and the two phases do not have just the same properties, as shown, for example, by their action on indicators.

#### PECULIARITIES WITH INDICATORS

The approach to the study of the more minute structure of soap solutions can be conveniently made through their reactions to indicators. A neutral soap is one in which the fatty acid is exactly neutralized by the alkali, and without a surplus of any alkaline salt. When a neutral soap is produced by the combination of exact equivalents of pure fatty acid and standard alkali it may be either acid, neutral or alkaline to such an indicator as phenolphthalein, depending upon the concentration of the water in the system.<sup>1</sup>

Take as an example pure sodium oleate, which is the nearest pure material to red oil soap. A chemically normal solution is practically 30 per cent strength. Phenolphthalein added to such a concentrated solution remains colorless, but as soon as water is added it begins to turn pink, and with increasing dilution becomes bright red. Again, if phenolphthalein is applied to the freshly cut surface of a solid gel of sodium stearate, the framework of the gel, which is the water-in-soap portion of the system, remains uncolored, while the contents of this framework, the soap-in-water portion, turn bright red. A drop of phenolphthalein solution placed on a 10 per cent sodium stearate-water gel remains uncolored. If, however, the gel is slightly squeezed to break the encircling fibers and bring out the enclosed sol, the spot turns bright red. A cold concentrated soap solution that does not turn pink with phenolphthalein becomes colored on warming. While the ordinary explanation would be that hydrolysis is increased, it is equally true that there is a change from water-in-soap to soap-in-water. If free fatty acid is added to a normal sodium oleate the mixture remains colorless on the addition of phenolphthalein, but when water is added it gradually gets pink and finally bright red. It is obviously not possible in soap analysis to draw very definite deductions from the addition of indicators to aqueous soap solutions.

The alkaline reactions are explained as due to the ordinary type of hydrolysis. The splitting up of soap in solution to form a trace of free alkali is the result of a very slight tendency to go back to its original raw materials and would be represented by



similar to the behavior of acetate of soda. The strength



of the caustic shown in this equation, even though very slight, is sufficient to prevent an equivalent of fatty acid being present at the same time, and the equation is not entirely true. Instead of a fatty acid we get an acid soap somewhere between the original neutral soap and  $\text{NaHP}_2$ , where P represents the fatty acid radical.<sup>3</sup>

#### "IONIC MICELLE"

A salt like sodium acetate would have a certain electrical conductivity in solution, and while soap would theoretically exhibit a much lower value, actually its conductivity is quite comparable, and that has led to the conception that the acid soaps consist of "ionic micelle," particles built up of molecules and parts of molecules but varying in actual constitution with each temperature or strength of solution and each addition of any sort to it. In other words, the acid soaps are not true salts, but represent parts of colloidal electrolytes.

Such colloidal electrolytes are salts in which an ion has been replaced by a heavily hydrated polyvalent micelle that carries an equivalent sum total of electrical charges and conducts electricity just as well or even better than the simple ions that it replaces.<sup>4</sup>

The high conductivity is not explained by the hydroxyl ions, whose concentration is seldom much above  $\text{N}/1000$ , but must necessarily be due to the soap itself. With soap solutions of higher concentration it has been found that the undissociated substance is an ordinary colloid, while the organic ion is a micelle that maintains the conductivity. As solutions become more dilute, a gradual transition takes place from colloid to crystalloid, or from the colloidal type of electrolyte to the true solution type like sodium acetate, with simple ions.

#### RECENT OBSERVATIONS

The exact connection between the individual constituents of soap solutions and their use as detergents has not yet been fully established, but some extremely interesting observations have been presented<sup>2, 3, 4</sup> and more work is promised. Some parts of the soap act as protective colloids to keep dirt in suspension or emulsion, while some form parts of the gel and curd structures.

That soap solutions must have some rather definite form of structure can be easily seen from a crude experiment. As performed by the present writer, a number of gallons of approximately 2 per cent Ivory soap were prepared and allowed to cool and stand for several days. When finally examined, it was a stringy, almost gelatinous mass. Suspended in it, however, were myriads of small white spherical bodies of perhaps a millimeter in diameter, some of which were arranged in the form of very definite chains. Under the microscope each sphere

was found to radiate innumerable fine filaments. The soap mass had to a certain extent separated from a liquid that was nearly as clear as water and did not appear to contain any appreciable amount of soap. It was, however, distinctly alkaline, and yielded a large precipitate of soap curds on the addition of salt.

The remarkable work of McBain and his co-workers goes far beyond the units that we can see, and was, in fact, very largely performed under the ultramicroscope. It establishes quite conclusively that there are definite, systematic arrangements of molecules and colloidal groups.

#### MOTION IN SOAP SOLUTIONS

Motion is the "without which nothing" in the use of soap, but the scrubbing board and the dolly washer provide only one important part of it. The other, equally important, is the Brownian motion of particles of soap, dirt and oils in suspension in water. Any particle of matter surrounded by a liquid is subjected to constant bombardment by its molecules. If the particle is large, no impression is made upon it, but if small enough it is affected, and since the molecular forces are usually not balanced, the particle is driven hither and thither and kept an active motion. One main purpose of soap is to help maintain this motion and hold the dirt in suspension until it passes to the sewer.

Among the constituents of soap solutions, several show Brownian motion. One kind of particle that is a product of hydrolysis is always observed in soap sols, gels and curds.<sup>2</sup> This type varies in size, comprising particles visible to the naked eye down to those of very low ultramicroscopic dimensions. These are merely a solid product of hydrolysis which is regulated entirely by the low OH ion concentration in these soap systems and is, in a sense, an unessential part of the solution.

Brownian movement is exhibited by two other constituents of soap solutions. It is shown by portions of curd fibers that are not attached to any solid body, as to a network of other such fibers. More important, however, are the innumerable milky white particles which appear to be present in all soap systems, usually just below the highest powers of visibility. It is probable that these, like the curd fibers, consist of neutral, undissociated soap colloid.

#### SOAP CURDS ARE FIBERS

Curds form from cooling or from salting out soap solutions. Their distinctive characteristic is that the curds, including those from palmitic and stearic acids, are composed of a felt of fibers which may be centimeters or inches in length, but usually of ultramicroscopic diameter. Some apparent fibers are even visible to the naked eye, but these are bundles of the much finer ones.

On cooling, or on addition of various substances to soap solutions, there are formed not only the white, opaque curds but, to quote McBain<sup>3</sup>, "We are tending

<sup>3</sup> One of the best recent discussions on the nature and properties of soap solutions is found in the Third Report on Colloid Chemistry of the B. A. A. S. 1920.

<sup>4</sup> McBain and Salmon. J. A. C. S., 42, 426 (1920). "Soap Solutions and Their Constitution."

toward the opinion that in a *gel* there exist well-developed strings of long molecules forming an exceedingly fine filamentous structure which accounts for the elasticity of gels and also for the fact that they exhibit more or less clearly oriented properties. These strings of molecules which we contemplate may be microns or millimeters long; in other words, they consist of innumerable molecules placed lengthwise, and their formation would, of course, be ascribed to residual affinity. The strong tendency of soaps to form such structures is proven by the manner in which they form filamentous and fibrous curds. . . . In one undoubted instance, we observed and photographed a cloudy gel of sodium oleate which, in addition to curd fibers, contained an exceedingly fine and delicate filamentous network."

Returning to curds, the structure is known more definitely and the study has even employed the versatile "movies." Structures too fine for observation in the ordinary microscope have thus been photographed and thrown on a screen to show their life history from formation to disappearance. Soap curds consist invariably of fine fibers. "In the case of all sodium soaps these may be many centimeters in length, and may be straight or characteristically curled, but they are never of greater thickness than about one micron; that is, not above 1/100 millimeter."

While these curd fibers represent the only mechanical structural element of sodium soap curds, a curd really ". . . consists of a felt of fibers in which is enmeshed an aqueous liquid containing, according to the temperature, traces of soap and alkali, the product of hydrolysis, or perhaps large amounts of soap or gel depending upon age, previous history and, of course, temperature."

#### A CHARACTERISTIC CASE

The behavior of a sodium palmitate solution will summarize some of the main points. At 100 deg. Cent. sodium palmitate is extremely soluble, and while dilute solutions are partly true or crystalloidal, concentrated solutions consist chiefly of neutral colloidal sodium palmitate, together with sodium ion and colloidal ionic micelle, which contain part of the neutral colloid. Where the pure palmitate has a molecular weight of 255 the micelle has a value of possibly 3,000. Here practically all the soap is in the colloidal state, with perhaps half of it in the form of neutral colloid.

On cooling below 70 deg. Cent., definite orientation of the colloid in the sol becomes so pronounced that the fibers begin to appear. Separation increases as temperature is lowered, at the expense of the other forms of soap, until 0 deg. is reached, where sodium palmitate is very insoluble. Here it separates from solution practically quantitatively in the form of heavily hydrated curd fibers leaving behind nearly pure water.

The same description applies to all soda soaps except that some, like the stearate, are more insoluble than the palmitate, while others, like the oleate, are more soluble.

The potassium soaps are somewhat different. Soaps of the ordinary saturated fatty acids are more soluble. Instead of long rigid curds, theirs are much shorter, only a fraction of a millimeter in length.

While the action of the individual kinds of colloidal particles may not yet be definitely assignable to their proper places, for example, in an analysis of the scouring operation, evidence has been presented to indicate that they must have definite functions.

*(To be continued.)*

#### DEVELOPERS FOR PARA RED

A note in the Bulletin of the Mulhouse Society says that solutions of diazotized para-nitraniline containing an excess of mineral acid give pale yellowish shades. To obtain rich and bluer shades, the free acid must be neutralized with an excess of sodium acetate. A satisfactory and cheaper process consists of replacing part of the sodium acetate by its equivalent of sodium carbonate, in quantity just insufficient completely to neutralize the mineral acid. For the preparation of printing pastes containing diazotized para-nitraniline it is preferable to replace all the sodium acetate by its equivalent of caustic soda. Binder reports favorably on the process, although slightly inferior shades are obtained than when sodium acetate is used alone. When sodium phosphate, calcium carbonate or magnesium carbonate is used in place of sodium carbonate, still less satisfactory results are obtained. In a process communicated by C. Sunder the diazo solution contains 2,760 grams of para-nitraniline, 1,500 grams of sodium nitrite, 10,600 grams of hydrochloric acid of 10 deg. Be. and 361 grams of calcium acetate solution of 15 deg. Be. per 120 liters.

#### SCOURING OF COTTON FABRICS

At a recent meeting of the Manchester Section of the Society of Dyers and Colourists, J. Huebner read a paper on the effect of scouring and bleaching upon the structure and strength of cotton fabrics. He described the results of a large number of tests which have been carried out in order to ascertain the effect of different methods of boiling and of bleaching upon the tensile strain, the elongation, the ripping strain, and other properties of cotton fabrics. He stated that a very thorough cleansing and bleaching of a fabric should not materially reduce its tensile strain. The ripping strain was also little affected by the scouring, but was more appreciably affected by the bleaching operation. He pointed out that both the tensile and the ripping test provided useful information, and that the tensile test alone did not give a complete record of the changes which occurred in a fabric during scouring and bleaching. Attention was also drawn by the lecturer to the fact that the results obtained in scouring and bleaching were considerably influenced by the structure of the yarn and of the fabric.



# The Control of Bleach-House Processes

## IV.—The Strength of Stock Soap Solutions\*

Difficulty of Gauging Weight of Soap Being Used in Bleaching—Simple Method of Exercising Control—  
Preparation and Use of Gauge Stick

By H. W. EASTMAN

IN many bleach houses it has long been the custom to work by "rule of thumb," and because a process has for years been carried out according to certain set lines the procedure is still adhered to at the present time, no thought or attention apparently being given as to whether such process could be simplified or improved or so controlled that proper manipulation of same would result in a better product and give assurance that satisfactory results could readily be duplicated.

Depth inches	Pounds of Soap
24	0
23	47 $\frac{1}{2}$
22	9
21	14
20	19
19	23
18	28
17	33
16	37
15	42
14	47
13	51
12	56
11	60
10	65
9	70
8	74
7	79
6	84
5	88
4	93
3	98
2	102
1	107
0	112

Gauge stick for determining weight of soap to be added to depleted stock solution

In presenting this short article it is the intention of the writer to outline a method for a more accurate control of soap used in the bleach house.

### MANIPULATION OF SOAP BATH

In the majority of the operations in a bleach house,

\*Previous papers of this series will be found in The Reporter for September, October and November, 1921.

where soap is employed, the latter is used only after it has first been thoroughly dissolved in hot water.

It is customary to have a stock tank of dissolved soap constantly at hand, but unfortunately, in the majority of cases which have come to the writer's attention, the strength of the stock liquor is not known, and consequently it is impossible accurately to gauge the number of pounds of soap being used in the different steps of the bleaching operation.

An accurate control of the soap consumption can easily be inaugurated by the following simple procedure:

1. Ascertain the capacity, in gallons, of the tank used for containing the soap solution.
2. Measure the depth of liquor in the tank, when same is conveniently full, and prepare a gauge stick showing depth, the total depth being divided into inches.

*Illustration:* Assuming that a rectangular tank measuring 72 inches in length and 36 inches in width is filled to a depth of 24 inches, then

$$72 \times 36 \times 24 \div 231 = 269.3 \text{ gallons}$$

Mark off twenty-four 1-inch divisions on the gauge stick, each inch thus representing

$$269.3 \div 24 = 11.2 \text{ gallons}$$

A 5 per cent soap liquor is easily prepared and makes a convenient strength of stock liquor.

If it is desired to fill the tank to the full depth of 24 inches, or 269.3 gallons, with a 5 per cent soap solution, then approximately 112 pounds of soap would be required according to the following calculation:

$$100 \text{ gallons of water} = 830 \text{ pounds}$$

$$100 \text{ gallons } 5 \text{ per cent soap contains:}$$

$$8.3 \text{ pounds} \times 5 = 41.50 \text{ pounds}$$

$$2.693 \text{ pounds} \times 41.5 = 111.76 \text{ pounds}$$

Therefore, each inch division on the gauge stock represents:

$$111.76 \div 24 = 4.66 \text{ pounds soap}$$

Place 112 pounds of soap in the stock tank, add sufficient water to cover same, turn on steam and heat until

thoroughly dissolved. Then add water up to the 24-inch division on the gauge stick, and mix thoroughly.

Assuming that the tank, properly prepared as above, has had soap solution used from it during the day's run, so that the height of liquor in the tank indicates 18 inches, and it is desired to replenish the tank to the 24-inch division—

Read off from the gauge stick at 18 inches the required weight of soap—i. e., 28 pounds. Add 28 pounds of soap to the stock tank and heat until dissolved, then dilute to 24-inch division with water, and mix thoroughly.

Of course, if the stock tank were kept for indefinite periods of time, at a high temperature, there would, of necessity, be a loss of water due to evaporation, and the

stock soap solution would become concentrated and the strength unreliable.

If, however, the tank is only warm enough to keep soap in solution, the loss of water due to evaporation is negligible for practical purposes.

The solution must be heated by a steam coil in the bottom of the tank and not by an open steam pipe, as in the latter case the condensed steam would serve to dilute the stock soap liquor.

The above method has been found to yield excellent results, under practical working conditions.

The gauge stick can be so graduated as to show the number of pounds of soap required for each inch in depth, as is shown in the accompanying illustration.

## Things Every Textile Chemist and Colorist Should Know

*[Note—Under this heading will be introduced as a more or less regular feature the discussion of various fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.]*

*Erratum—Under this heading in the last issue, "Two Types of Bleaching: Oxidation and Reduction," sodium peroxide was represented as  $\text{Na}_2\text{C}_2$  through a typographical error. This should read  $\text{Na}_2\text{O}_2$ .*

### No. 3

#### Hygroscopic Moisture, Per Cent Moisture Content, and Per Cent Regain

ALL textile fibers which are under direct atmospheric exposure contain moisture. The percentage present may vary greatly depending upon the relative humidity of the atmosphere, i. e., the ratio of the quantity of water vapor actually present in a given volume of the atmosphere to the quantity which would be required to saturate the same volume of atmosphere at the existing temperature. In other words, the greater the quantity of moisture present in the air to which textile fibers are exposed the higher the per cent of moisture content.

The normal moisture present in textile material is of a hygroscopic nature and this explains why the percentage may vary to such an extent.

By hygroscopic moisture we mean water that is not chemically combined as an actual constituent of the main substance of any material, but mechanically held in its pores; hygroscopic substances being at least

microscopically porous. A hygroscopic substance, when placed in a very dry atmosphere, will gradually give up its moisture, and if heated for any length of time to a temperature just above the boiling point of water, the hygroscopic moisture will be entirely driven off. It is therefore possible to determine with considerable accuracy the percentage of hygroscopic moisture in any substance by carefully noting the loss of weight when it is heated to constant weight at a temperature of from 212 to 220 deg. Fahr. (100 to 104 deg. Cent.).

A distinction is made between "percentage moisture" and "percentage regain." For example, if a ten-gram skein of yarn is heated in an oven at a temperature just over 100 deg. Cent. until it comes to a constant weight (sometimes called "bone-dry weight") and it is found to weigh nine grams, it is said to have contained 10 per cent of hygroscopic moisture. If this same skein is then placed in the ordinary atmosphere it will rapidly absorb moisture and if the air is sufficiently moist it will, after a few hours, regain its original weight. If when it comes to constant weight in any particular atmosphere it should weigh exactly ten grams the "regain" would be one gram or 11.11 per cent. This difference in percentage hygroscopic moisture and percentage regain is due to the fact that the former is calculated on original weight while the latter is based on bone-dry weight.

According to W. D. Hartshorne, the regain of wool in the form of worsted tops may vary from 10.4 per cent at temperature of 100 deg. Fahr. and a percentage humidity of 40 to 27.1 per cent at a temperature of 50 deg. Fahr. and percentage humidity of 100.

The percentage moisture content of the three common fibers—cotton, silk and wool—is found to vary about as follows at a temperature of 75 deg. Fahr.:



Per Cent Relative Humidity	Cotton	Silk	Wool
30	4.0	6.0	9.0
50	5.5	9.0	12.5
70	8.0	11.5	16.0
90	13.5	18.5	23.0

The term "condition" is frequently used to express the relative percentage of hygroscopic moisture in tex-

tile material and the term "conditioning" is used both to designate the process of determining the moisture content and in reference to the process of imparting to textile material a certain desired quantity of moisture.

In recent years the moisture content of textile fibers has become a very important factor in many manufacturing and finishing processes, and the attainment of the best results is often found to depend to no little degree upon its control.

## The Chemical Constituents of Raw Cotton

By ROBERT GEORGE FARGHER, D.Sc., and JOHN CHARLES WITHERS, Ph.D.

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[Note—Figures in parentheses refer to Bibliography on p. 120.]

### I. HISTORICAL INTRODUCTION

Although no systematic examination of the constituents of raw cotton would appear to have been undertaken prior to 1860, the presence and importance of constituents other than cellulose had been recognized even to the extent of controversy.

A. Penot (1), in an article on bleaching, included in the substances to be removed, resinous matter natural to the filaments, the pigment of the plant, a fat, a "cupreous" soap, and a calcareous soap, and gave short accounts of the existing knowledge of these materials; whilst Persoz (2) noted the presence of (a) a coloring matter, (b) a "peculiar resin," insoluble in water and not readily soluble in alkalis, to which he attributed the role of a reserve and "protector" of the coloring matter from the action of decolorizing agents (c) fatty matter, and (d) inorganic salts.

The question had also attracted the attention of the French Academy of Sciences (3), where there was prolonged discussion as to whether cellulose existed in one or more forms. Fremy held that more than one existed, basing his argument on the differing behavior of cellulose from various sources towards Schweitzer's reagent, and introduced the term *para-cellulose* to cover the more difficultly soluble forms; whilst Payen considered this difference apparent rather than real and attributable to incrustation with gum and other foreign matters. He thought that a layer of infinitely small bubbles of air condensed on the surface might to a lesser extent exert the same effect. Some thirty years earlier, he had shown that the epidermis of plants was covered with a very thin envelope containing fatty matter, some nitrogen, and silica. His experiments had been extended by Brongniart and by Mitscherlich, the latter supposing the covering medium to be a slender coating of "suberic matter," "a suberic material capable of yielding suberic acid and also succinic and nitric acids," to which coating he ascribed the difficulty of "wetting" fresh cotton. Fremy recognized in

this coating all the characteristics of a fatty substance, "cutin," which, on saponification, yielded a substance with the properties of a fatty acid.

The first systematic investigation was reported to the Manchester Literary and Philosophical Society on February 4, 1868, by Schunck (4), who boiled two samples of cotton yarn (East Indian, variety "Dhollerah," and middling Orleans), with sodium carbonate in an open kier, and examined the flocculent precipitates obtained on acidifying the dark brown liquors with sulphuric acid. These amounted to 0.34 and 0.48 per cent of the cotton respectively and yielded (a) a substance designated "cotton wax," the analyses of which are in fair agreement with an alcohol  $C_{24}H_{49}OH$ ; (b) margaric acid (a eutectic mixture of palmitic and stearic acids); (c) two "coloring matters," one freely and the other sparingly soluble in alcohol, the composition indicating rather a mixture of partially hydrolyzed proteins; (d) pectic acid; and (e) albuminous matter. By fusion of the crude extractive matter with sodium hydroxide, he isolated a substance closely resembling tyrosine, whilst incineration yielded 2.3–6.9 per cent of ash, consisting chiefly of the oxides of iron and aluminium, aluminium silicate, calcium sulphate, and sodium sulphate.

### II. GENERAL DIFFERENTIATION

The first attempt to figure the cotton hair is generally attributed to Thomson (5) in 1834. Crum (6), in a series of communications dealing with dead cotton and with the manner in which cotton unites with coloring matters, depicted longitudinal and transverse sections of cotton hairs in various stages of maturity, and dealt with the effects of mercerization. The examination was facilitated by the employment of specimens dyed with madder on an aluminum mordant. His results discredited the earlier idea that the hair was a hollow tube filled with air and more or less collapsed, and replaced it by that of a hollow sheath enclosing a deposit of cellulose.

Very shortly afterwards O'Neill (7), by microscopical examination of the action of Schweitzer's reagent on the hair, approached very closely the modern conception. He considered that cotton exhibited (a) an external membrane distinct from the true cell wall or cellulose matter, (b) spiral vessels situated either in or outside the external membrane, (c) the true cell wall or cellulose, and (d) an inner medullary matter.

More recently, Haller (8) has described the microscopic appearance of the fiber and distinguished three parts—the *cuticle*, the *cell membrane*, and the *lumen*.

The *cuticle*, consisting of "cutinized cellulose," has a finely grained or fibrous structure, is insoluble in ordinary cellulose solvents but soluble in strong alkalis, and is resistant to boiling under pressure with lime or even with sodium hydroxide of 2–8 deg. Tw. It is, therefore, so Haller considers, very doubtful whether the "cutin" in the cuticle is a fat as suggested by Wiesner.

The *cell membrane*, consisting of almost pure cellulose, is more or less colored, the pigment being resistant towards common solvents, but destroyed by long contact with oxidizing agents. The membrane is soluble in ammoniacal copper hydroxide solution ("cuprammonium"), treatment with this reagent leaving the cuticle and inner skin hanging in shreds.

The *lumen* contains dried protoplasm, which extends also into the adjacent layers of the membrane. The protein is rendered visible by staining with safranin, the hairs being steeped in a solution of the dye in dilute acetic acid, and then washed with water and boiling alcohol, when the reddened protoplasm can be distinguished under the microscope, especially if the dyed fiber has been treated first with "cuprammonium." Haller suggests that in mercerized cotton the cuticle is entirely lacking, and that in dyed unmercerized cotton the color is only absorbed on the surface, whilst on mercerization penetration occurs, this accounting for the deeper colors. In a later paper (9), he concludes that the outer membrane consists of two structural elements which show little difference under normal conditions but are readily differentiated when the cellulose is transformed into oxy- or hydrocellulose.

Levine (10), by chemical and bacteriological treatment, followed by microscopic examination, draws the conclusion that there are five structural elements involved—(a) the *outer layer or integument*, which is the encrusting layer and forms the cementing material of the fiber, being a mixture of cutinous, pectinous, gummy, fatty, and other components; (b) the *outer cellulose layer*, a distinct spiral comprising a limited number of components, perhaps one or two, and possibly consisting of impure cellulose; (c) the *secondary layer of deposits*, made up of components which in no case have a spiral structure and are five to ten in number; (d) the *wall of the lumen*, a spiral much the same as the outer layer, but differing in chemical composition; (e) the *lumen*, the substance of which is structureless and nitrogenous. The evidence on which the conclusions are based is not detailed.

A comparative study of the materials for making cel-

lulose esters has led Noyer (11) to suggest that the cuticle consists of oxycellulose, which is porous, has great osmotic properties, and is not acted on by esterifying agents, but allows these to penetrate into the fibrils by osmosis. Konig and Rump (12) have dealt recently with the chemistry of vegetable cell membranes, dividing the difficultly soluble portions into three classes—*pentosans*, *hexosans*, and *lignins*. In each of these, one part, termed *proto-*, is rendered soluble by enzymes or by water at two to four atmospheres pressure. A second and larger part, termed *hemi-*, becomes soluble on boiling with 1 to 3 per cent acids at two to four atmospheres pressure, whilst a still larger portion, termed *ortho-*, is only dissolved by strong acids or by dilute acids under higher pressures. The *ortho-* group which includes cutin and suberin can be resolved further by treatment with weak oxidizing agents, the lignins undergoing oxidation and the orthocelluloses and cutin remaining.

Many excellent sketches made by the help of the Abbe appliance illustrating the structure of the cotton hair are to be found in a series of communications by Minajeff (13), in which the behavior of mercerized and non-mercerized cotton towards dyes is compared. The most recent contribution is that of Balls (14), who shows the existence of daily growth rings in the cellulose layer corresponding with the period of maturation of the fiber.

### III. PROXIMATE ANALYSES

Although hundreds of analyses of the whole cotton plant have been recorded by American agricultural chemists, few reports on the fiber itself have appeared. The following data by Church and Muller are quoted by many authorities, including J. M. Matthews (15), although their value, in the light of more recent work, is open to question:

	Sample I %	Sample II %	Surat. %	Ameri- can %	Egyptian %
Cellulose .....	91.15	91.35	91.35	91.00	90.80
Wax .....	0.51	0.40	0.40	0.35	0.42
Protoplasm, etc.	0.67	0.50	0.53	0.53	0.68
Ash .....	0.11	0.12	0.22	0.12	0.25
Water .....	7.56	7.00	7.50	8.00	7.85

Somewhat different figures are recorded, for example, in Bulletin No. 33 of the United States Department of Agriculture (16), which J. H. Barnes (16a) considers to be more representative:

Cellulose .....	83.71%
Ash .....	1.65%
Protein .....	1.50%
Fat .....	0.61%

A few determinations of some of the mineral constituents of carding waste have recently been published by H. D. Martion (17).



*Analytical Methods*—Two papers dealing with analytical methods may be mentioned here. In the first Barthelmy (18) describes the determination of water, ash, fats and waxes, pectic substances, lignose and cellulose in raw cotton. In the second, Schwalbe (19) outlines a scheme for the analytical investigation of vegetable fibrous materials, and proposes the determination of ash, moisture, fat, wax and resin, cellulose, furfuraldehyde, methylfurfuraldehyde and methoxyl group.

Roberts (20) has recently called attention to the fact that the inorganic constituents of a plant can only be determined accurately by extracting the plant itself with water and dilute acids. Part of the combined chlorine, for example, may be lost during ignition, whilst the amount of sulphate in the ash may exceed that originally present in the plant.

*Detection of ligneous impurity*—Woody material in cotton may be detected by reason of its greater affinity for malachite green (21), the color being retained after the addition of bleaching powder to decolorize the true cotton.

#### IV. EXTRACTION WITH SOLVENTS

The most complete reports on the amount of material removed by various solvents are those of Knecht and his collaborators (22, 23, 24, 25, 26). The following figures are typical:

	Cotton Sliver			Cotton Yarn	
	Egypt %	Bengal %	Texas %	American %	Egyptian %
Benzene .....	0.47	0.38	0.55	0.41	0.44
Alcohol .....	0.68	....	0.90	0.53	0.74
Water .....	1.46	....	1.61	1.66	1.51
Ammonia (1%) .....	0.48	....	0.39	0.43	0.50
Formic acid (1%) .....	0.46	....	0.72	0.65	0.41
Hydrochloric acid, cold dilute .....	....	....	0.43	0.66	0.54

By means of petroleum ether, Knecht has separated the benzene extract into two portions—"cotton wax A" and "cotton wax B." These are dealt with in the succeeding section, but it may be recorded that 72 per cent of the extract from Egyptian cotton and 80 per cent of that from American cotton dissolved in the petroleum.

Similar figures are given by Matthes and Streicher (27), who found that petroleum ether extracted 0.5 per cent from Caravonica cotton (from North Queensland), 0.36 per cent from Egyptian, and 0.34 per cent from American. The same cottons after bleaching yielded 0.25, 0.26, and 0.32 per cent respectively. Piest (28) extracted nine samples of cotton with ether, carbon tetrachloride and alcohol, and obtained small amounts of wax varying from 0.09 to 0.53 per cent, and Barnes (16) has found that ether extracts from 0.188 to 0.618 per cent from various Indian cottons. Knecht (25) has recently noted that one effect of destroying the fibrous structure of the

extracted cotton mechanically is to release a further quantity of extractive matter.

The use of organic solvents on the large scale is mainly confined to the "degreasing" of cotton waste, for which benzene, petroleum, and chlorinated hydrocarbons have been employed. The pioneer work was carried out in this country by J. W. Mitchell (29), who originally tried carbon disulphide and benzene, but ultimately (29a) decided that benzene is the most satisfactory solvent. Goehrig (30), however, has applied such liquids to the cleansing of textile materials generally, and has described the necessary plant and precautions. Recently, the use of benzene in the removal of wax from linen has been protected (31, 31a).

Apart from the wax, little is known about the material extracted save that it appears to contain much mineral matter. In the case of the cotton yarns examined by Knecht (24), the alcoholic extracts were amorphous, brown, and hygroscopic. They reduced Fehling's solution, and the ashes contained respectively 17.9 and 23.4 per cent of  $K_2O$ . The water extracts were similar, but did not reduce Fehling's solution so readily. They contained respectively 50.4 and 54.5 per cent of mineral water.

Lester (32) has examined the aqueous extract of raw cotton, and gives the following figures for the extract: Ash 39.2 per cent, fatty acids 62.3 per cent, soluble in ether 17.5 per cent, soluble in cold water 39.5 per cent.

The ash in the original cotton had been reduced from 0.82 to 0.21 per cent, whilst the cotton still contained 0.31 per cent of material soluble in ether.

Higgins (33) states that if cotton (or linen) is completely extracted with benzene, then treated with acid, washed and dried again, a further quantity of fatty acid, about 10 per cent of the first amount of wax, may be obtained by boiling with benzene. The acid washings contain magnesium, from which the conclusion is drawn that some of the fatty acid is present as a magnesium salt. Knecht also reports that after extracting cotton with benzene and then bleaching, a further, but smaller, extract can be obtained.

#### V. THE WAX OF COTTON

The only investigation of cotton wax which is more than cursory is that of Knecht and Allan (23), who

found that the benzene extract of raw cotton could be differentiated by means of petroleum ether into "*soluble cotton wax A*" and "*insoluble cotton wax B*." For the Egyptian cotton on which the main investigation was conducted the ratio was 72 per cent of the soluble wax to 29 per cent of the insoluble, whilst for an American cotton it was 80 to 20 per cent.

"*Cotton wax A*" is odorless, dull yellow in color, and closely resembles beeswax in texture and fracture. It has m.pt. 66–67 deg. Cent.; iodine value 28.55; acid number 44.1; and saponification value 84.3. About 18.8 per cent is undissolved by boiling 96 per cent alcohol. It is saponified with difficulty, but by using glycerol and sodium hydroxide it gives 47.5 per cent of unsaponifiable matter, consisting of (a) hydrocarbons [hentriacontane ( $C_{31}H_{64}$ ) and dotriacontane ( $C_{32}H_{66}$ ) were definitely isolated]; (b) a phytosterol, giving an acetyl derivative melting at 127 deg. Cent., but otherwise unidentified; and (c) fatty alcohols unidentified owing to lack of material. The soap yields palmitic, stearic, and cerotic acids.

"*Cotton wax B*" forms a dark green granular mass, with m.pt. 68 deg. Cent., acid number 4.03, and saponification number 83.3. The unsaponifiable portion yields 53.5 per cent of a reddish brown sticky wax melting at 63.6 deg. Cent., and giving on acetylation a considerable quantity of a phytosterol acetate with m.pt. 122.4 deg. Cent. The soap yields a small proportion of melissic acid.

Both Knecht and Piest (28) have ascribed reducing properties to cotton wax, as it appears to increase the "copper number" of cotton. The reducing agent may be similar to an aldehyde detected by Hoffmeister (24) in the wax of flax.

## VI. THE ASH OF COTTON

According to Matthews (15), the ash of true cotton never exceeds 1 per cent, but Barnes (16) contends that this is incorrect. Twelve Indian cottons, he found, averaged 2.48 per cent, the extreme values being 1.34 and 3.99. The amounts of silica and chlorine present were in accord with the figures for total ash. Five samples of American cotton gave values ranging from 1.18 to 1.92, whilst two Egyptian samples gave 1.37 and 1.50 respectively. A two-ply 60 American cotton examined by Knecht (24) contained only 0.93 per cent, a similar Egyptian sample 1.17, and a soft twist Egyptian 0.89 per cent of ash.

In the above series of Indian cottons, the percentage of chlorine varied from 2.23 to 6.53, and the proportion of the ash insoluble in hydrochloric acid, ascribed to silica and silicates, from 4.44 to 28 per cent.

Two complete analyses of the ash are quoted by Barnes as follows:

	Bombay	Punjaub
	%	%
Moisture in original fiber .....	2.23	3.78
Total ash in dry fiber .....	3.99	1.85
Constituents of the ash: $SiO_2$ .....	15.56	14.40

		Bombay	Punjaub
		%	%
Constituents of the ash:	$Al_2O_3$ .....	10.80	12.87
	$Fe_2O_3$ .....	5.89	1.92
	CaO .....	9.75	10.65
	MgO .....	1.87	4.36
	$K_2O$ .....	27.32	26.03
	$Na_2O$ .....	4.51	8.40
	$SO_3$ ... ..	1.96	2.52
	$P_2O_5$ .....	3.26	4.46
	$CO_2$ .....	12.19	8.03
	Cl .....	6.55	3.84
Undetermined:		0.34	2.52

Extraction with solvents effects at least partial removal of the mineral constituents. Thus in the experiments of Knecht already quoted (24) the alcoholic extracts of Egyptian and American cottons, from which the wax had previously been removed, consisted largely of mineral matter, chiefly  $K_2O$ ,  $Na_2O$ , MgO,  $SO_3$ ,  $CO_2$  and  $P_2O_5$ . The ash of the former extract contained 23.4 per cent  $K_2O$ , and that of the latter 17.9. The succeeding water extracts contained respectively 54.5 and 50.4 per cent of mineral matter.

Lester (32) has compared the ash from the aqueous extract of cotton with that of the cotton itself. The latter contained 0.82 per cent, and 0.61 per cent was removed by the extraction. The constituents were as follows:

	Ash of Water	Ash of
	Extract	Cotton
	%	%
Magnesium carbonate .....	6.84	5.11
Magnesium phosphate .....	2.65	13.10
Alumina .....	3.90	3.90
Iron oxide .....	trace	2.71
Silica .....	1.75	1.00
Calcium carbonate .....	3.80	13.50
Sodium carbonate .....	27.78	15.90
Potassium carbonate .....	13.82	.....
Potassium sulphate .....	36.90	32.20
Potassium chloride .....	2.60	2.50
Sodium sulphate .....	....	4.60

Lester considers the "hygroscopic" properties of cotton to be due to some extent to the material extracted by water. Crace Calvert (35) found that nearly the whole of the phosphorus was removed by cold water extraction, and determined the phosphate content of a number of cottons. The percentage of soluble phosphate, calculated as  $P_2O_5$ , are as follows: Egypt, 0.055 per cent; New Orleans, 0.049 per cent; Bengal, 0.055 per cent; Surat, 0.027 per cent; Carthagen, 0.035 per cent; Macao, 0.050 per cent; Cyprus, 0.050 per cent.

When a sample of lint is burned, the skeletal structure is preserved in the ash, which suggests that the mineral substances are present in the tissue of the fiber itself rather than as dried-up cell sap. The latter point is



borne out by a consideration of the Indian cottons referred to in the foregoing analyses. The Punjaub sample is grown in very saline soil, is two months longer in the ground than the Bombay crop, and the district is one of the driest in India, yet the fiber contains more moisture and less ash than the Bombay sample. It is noteworthy also that the sample with the larger proportion of ash has the larger amount of carbonate in the ash, and presumably, therefore, a larger proportion of its inorganic constituents in the form of salts of organic acids. The absorptive power of cellulose has also been advanced to account for the fixation of some of the mineral constituents.

Balls (36) has determined the specific salinity of the cell sap of pure strains of Egyptian cotton, and finds a salt content which varies not only with the salinity of the soil but also with the variety employed. Plants of two Egyptian strains growing with interlacing root systems showed differences of as much as 10:7 in the salinity of their cell sap.

(To be concluded.)

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(To be concluded.)

#### DR. CHARLES BASKERVILLE

Dr. Charles Baskerville, director of chemical laboratories of the College of the City of New York, died of pneumonia on Saturday, January 28, at his home, 610 West One Hundred and Tenth Street, New York, in his fifty-second year. Dr. Baskerville was the author of a number of textbooks on chemistry and contributed many scientific articles. His researches embraced work on rare elements, on anesthetics and on many phases of industrial chemistry.

He was born in Noxubee County, Mississippi, June 18, 1870. He studied at the University of Mississippi in 1886 and 1887 and was graduated from the University of Virginia in 1890. He attended Vanderbilt University in 1891, the University of Berlin in 1893 and received the degree Ph.D. from the University of North Carolina in 1894. From 1891 to 1904 he was connected with the chemistry staff of the University of North Carolina as instructor, assistant professor and professor of chemistry and director of the chemical laboratory.

In 1904 he was called to the Chair of Chemistry at the College of the City of New York. He designed the large laboratory of that institution and served as professor of chemistry and director of the laboratories up to the time of his death.

He was a member and Councillor of the American Chemical Society, a Fellow of the American Association for the Advancement of Science, a Fellow of the Chemical Society, London, a member of the Society of Chemical Industry, the American Electrochemical Society, the New York Academy of Sciences, the Franklin Institute, Phi Beta Kappa Society and the Delta Kappa Epsilon Fraternity. His clubs were the Century, Engineers, Chemists', Graduate, City College, Colorado, Southern and Authors'.

The Liberty Chemical Company, 324 West Avenue, Pawtucket, R. I., has filed notice of organization. E. A. l'Heureux is head of the company.

# Proceedings of the American Association of Textile Chemists and Colorists

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## The American Association of Textile Chemists and Colorists

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Lowell Textile School, Lowell, Mass.

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## SECOND RESEARCH COMMITTEE MEETING (Concluded from last issue.)

It was considered desirable, wherever possible, to have a range of type colors sufficiently extensive so that unknown reds, yellows, greens, etc., could be compared against correspondingly colored type dyes.

It is the desire of the Council to eventually standardize all colors in order that each can occupy a proper place in our classification; and while this will extend over a long period of time, it will eventually be of great value.

The chairman designated the following as members of a special committee to formulate provisional plans for the determination of methods for fastness to washing on cotton:

James L. Amsden, Chairman;  
William K. Robbins,  
George A. Moran,  
A. E. Hirst,  
William H. Cady.

It was decided that such materials as cotton shirtings would require an extreme degree of fastness, whereas gingham would not require such a high standard.

It was felt that after the Association had proceeded sufficiently with the type of work under consideration, the methods of fastness approved by us would be accepted as standard in all cases.

It was pointed out that material used as standard type would have to be processed in a certain definite manner, the procedure being known and closely followed in every particular.

In the matter of type colors, it was suggested that ten type colors would be a reasonable number to consider.

It was decided that it would be better to make our nomenclature at present numerical rather than a descriptive name showing the classification of the dye or fabric. Words such as excellent, good, fair, medium, etc., might be used by the general public, but dyers and textile chemists could use the numerical nomenclature to greater advantage.

A paper covering the bibliography of fastness has been prepared by W. J. Murray, and this will be published in a current issue of the AMERICAN DYESTUFF REPORTER.

It was decided to hold the next meeting on Friday, February 10, 1922.

It was decided that the Special Committee meet at 5 o'clock on the day of the next Council meeting.

The meeting was then adjourned.

Respectfully submitted,

W. E. HADLEY, Secretary.

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## RHODE ISLAND SECTION MEETING

The next meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists will be held at the rooms of the Providence Engineering Society, 29 Waterman Street, Providence, on Friday, February 17, at 8 p. m. Officers for the year will be elected.

Robert Spurr Weston, of the firm of Weston & Sampson, consulting engineers, of Boston, will give an illustrated talk on "Water Purification for Textile Purposes."

This is a topic in which many of our mills are vitally interested at the present time, and a large attendance is desired. Please give this notice as much publicity as possible at your plant.

Members of the Association are invited to be present at the meeting of the Rhode Island Section of the American Chemical Society, on Friday, February 24, at 8 p. m., at the Providence Engineering Society Rooms. Professor Louis A. Olney of the Lowell Textile School, President of our Association, will speak.

HENRI N. F. SCHAEFFER,  
Secretary Pro Tem.



## ORGANIZATION MEETING OF NEW YORK SECTION

Pursuant to the action of the Council in approving the petition submitted for authority to form a local New York Section, the Secretary Pro Tem, E. H. Killheffer, sent the following letter to all of the members residing in New York and northern New Jersey:

Dear Sir—Please be advised that permission has been granted by the Council for the formation of a New York Section of the American Association of Textile Chemists and Colorists, to include principally the State of New York and northern New Jersey.

Will you please arrange to be in attendance at an organization meeting Friday evening, February 3, in Rumford Hall, Chemists' Club, 52 East Forty-first Street, New York City, at 8 o'clock?

Yours very truly,

(Signed) ELVIN H. KILLHEFFER,  
Secretary Pro tem.

and caused to be published in the AMERICAN DYESTUFF REPORTER, the following paragraph above a copy of the letter:

"Under date of January 26, the following letter was mailed to all members of the Association living in New York and northern New Jersey. Any members who failed to receive a notice are invited to be present."

The meeting was called to order at 8.15 P. M., Friday, February 3, in Rumford Hall of the Chemists' Club, by the Secretary Pro Tem and nominations were asked for a temporary chairman to preside over the meeting. Motion was made, seconded and carried that the Secretary Pro Tem remain in the chair.

Nominations were requested for Secretary Pro Tem to record the meeting. Mr. Low was nominated and duly confirmed.

The question of regular place for meetings was taken up in open discussion and while no definite or direct action was taken the general sentiment expressed was as follows:

1. That Newark is undesirable because of general inaccessibility.
2. That either Passaic or Paterson would be appropriate as these cities are textile centers.
3. That New York was most convenient for all concerned.

The suggestion of alternating meetings between Passaic and New York was well met. No definite decision beyond that New York would be the meeting place for the present, was reached.

A motion was made that steps be taken to effect a permanent organization and that the chairman open nominations for officers. Seconded and carried.

Mr. Scott nominated Mr. Hadley, for permanent chairman, seconded by Dr. Harold. Mr. Hadley declined on the ground that he was already serving the organization in other capacities. Mr. Perlman nominated Mr. Killheffer. Mr. Killheffer declined on the ground that the first chairman would more properly be some one engaged in actual textile production. Mr. Unterweiser nominated Mr. Scott, seconded by Mr. Schumann. Mr. Scott declined on the ground of locality.

Dr. Cathcart made the proposal that Chairman Pro Tem appoint a Committee of five of which the Chairman should be a member ex-officio to draw up a slate of proposed officers, ascertaining beforehand that the election would be acceptable to those nominated, to be presented and voted upon at a future meeting. The suggestion was reworded into the form of a motion, seconded and carried.

It was suggested that a program committee be also appointed to arrange for the next meeting. Dr. Cathcart amended his first motion to the effect that the program be also the duty of the Nominating Committee. The amendment was seconded and carried.

The Chair proceeded to appoint the following Committee:

E. H. Killheffer (chairman ex-officio)  
Dr. W. R. Cathcart  
F. J. Oesterle  
W. E. Hadley  
E. G. Quin

Chairman called for further business and the matter of financing the Section was discussed. Without direct motion it was decided to leave the arranging of this phase to the recently appointed Committee of five.

Discussion followed regarding places of meeting. The informal decision here also was to leave this matter to the Committee.

Motion was made to adjourn, seconded and carried.

Following is a list of those who attended:

Walter M. Scott, Elvin H. Killheffer, William R. Cathcart, L. C. Lewis, H. J. Daignault, E. G. Quin, William C. Dempster, Herbert Grandage, Giles Low, Jos. S. Unterweiser, Everett H. Hinckley, C. M. Edward Schroeder, J. F. X. Harold, Frank C. Holden, Chas. F. Schumann, A. S. Helm, H. S. Busby, W. E. Hadley, S. Donald Perlman, Stanley Mayer, Edward Mayer, Frank J. Oesterle.

Respectfully submitted, February 4, 1922.

GILES LOW,  
Secretary Pro Tem.

## A BIBLIOGRAPHY OF LITERATURE ON THE FASTNESS OF DYES

By WALLACE J. MURRAY

*Contribution from the Laboratories of  
Arthur D Little, Inc.*

## INTRODUCTION

A search has been conducted through abstracts published in the Journal of the Society of Chemical Industry and Chemical Abstracts for articles on the definition and testing of the fastness of dyestuffs. These cover journal articles only.

The abstracts of the Society of Chemical Industry go back to 1882. These have been used from that date to 1907. "Chemical Abstracts" of the American Chemical Society were first issued in 1907 and have been used from that date to the present time. References have been found to journal articles which have not been abstracted in either of these journals. In these cases the information given in the table is incomplete, since the writer has been unable to obtain either the original articles or abstracts. A reference to an abstract in the English language is given wherever possible, since the original articles are often both difficult to obtain and in foreign languages.

A study of the journal literature gives a good idea of the development of the testing of dyestuffs. Many books have been published dealing with this subject. Almost all of the information in them is based on material previously published in the journals. For this reason it has not seemed desirable to give a full list of such books. Instead, only a few typical books will be mentioned.

The majority of the large color manufacturing firms have issued books on the colors which they produce. In most cases tests for fastness are included. Generally the method for carrying on these tests is specified, and the fastness indicated by a series of comparative numbers. Some firms make No. 1 the fastest and others make No. 1 the most fugitive.

There are a number of textbooks which deal with the testing of dye fastness. A list including a few typical examples will be found at the end of the journal bibliography.

Some of the large chemical dictionaries give articles on testing dyestuff fastness. A good example of an article of this type is in Ullmann's Enzyklopadie der Technischen Chemie (1907), Vol. 5, page 262. This gives a fairly good abstract of the tests adopted in 1914 by the Echtheits Kommission, and a small amount of explanatory matter.

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1888	Bull. Soc. Chem., 49, 860	I. Joffre	Fastness of Colouring Matters Fixed on Textile Fabrics	J. S. C. I., VII, 671
1890	Oest. Woll und Leiman Ind. 6, 288	P. Muller	Fastness to Light of Substantive Cotton Dyes	J. S. C. I., IX, 856
1891	Zeits f. Angew Chem. 7, 211-212	A. Woscher	The Fastness of Dyed Colours to Light and Air	J. S. C. I., X, 634
1891	J. Soc. Arts, 1891, 535-548	J. J. Hummel	Fast and Fugitive Dyes	J. S. C. I., X, 832
1891	J. Soc. Dyers & Col., 1891-82-84	T. Frusher	Permanent and Fugitive Colors to Light on Wool	J. S. C. I., X, 833
1891	Chem. Zeit. 15, 43 and 75	W. Evans	Fastness of Aniline Black	J. S. C. I., X, 541
1892	J. Soc. Ch. Ind., XI, 12	J. J. Hummel	Fast and Fugitive Dyes (discussion of J. Soc. Chem. Ind.), X, 832	J. S. C. I., XI, 12
1894	J. Soc. Dyers & Col., 1894, 90	A. Duffen	The Fading of Colors	J. S. C. I., XIII, 633
1895	J. Rus. Phys. Ges., 1895, 27, 80	W. W. Oglobin	Fading of Colors on Cotton	J. S. C. I., XV, 32
1896	Chem. News, 74-205			.....
1896	Revue Chim. Ind., 1896, 7, 39-40	G. Dommergue	Fastness to Light and Street Mud of Colours on Wool	J. S. C. I., XV, 271
1897	Z. Angew Ch., 10-100	Kitchelt	Fastness	No. Abs.
1897	Farb. Ztg., 8, 138	Lehne	Fastness	No. Abs.
1898	Bul. Soc. Ind. Mulhouse, 1898, April-May, 119-123	A. Scheurer	Means of Measuring the Action of Light on Colors	J. S. C. I., XVII, 759
1898	Textile Record & J. Soc. Dyers & Col., 14 (8), 176-178	J. Herzfield	Testing the Fastness of a Dyestuff	J. S. C. I., XVII, 842
1898	Bul. Soc. Ind. Mulhouse, 1898, Aug.-Nov., 273-283	A. Scheurer A. Brylinski	Means of Measuring the Action of Light on Colors	J. S. C. I., XVIII, 137
1899	Bul. Soc. Ind. Mulhouse, 1899, 96-97	A. Scheurer A. Brylinski	Means of Measuring the Action of Light on Colors	J. S. C. I., XVIII, 580
1900	Oester Ch. Zeit., 3, 265	E. Valenta	Testing the Fastness to Light of Printing Colors	J. S. C. I., XIX, Ch. Centr., 1900, 2 (3), 223
1900	Bul. Soc. Ind. Mul., 1900, July-Aug., 207-208	P. Dosne	Method of Determining and Expressing the Fastness of Colors to Light	J. S. C. I., XIX, 1108
1902	Z. Farb. Ind., I, 656	G. v. Georgievics	How Should Dyes Be Tested for Fastness?	No. Abs.
1903	5th Int. Cong. Ap. Chem., Berlin, Ber. II, 822, Farb. Zeit., 1903, 14 (15), 269-276	H. Lange	What Treatments Are to Be Regarded as Satisfactory in the Examination of Dyestuffs with Respect to Fastness?	J. S. C. I., XXII, 947



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Year	Journal and Date	Author	Title	Abstract
1904	Leipziger Mon.-sh. f. Text. Ind., 19, 21 and 100	Kitschelt	Fastness of Dyed Wool to Light	No Abs.
1904	Farb. Zeit., 15, 373-377	E. Davidis	Fastness to Perspiration of Dyed Goods	J. S. C. I., XXIV, 85
1908	Rev. Gen. Mat. Col., 12, 289-292	A. Bolis	Researches on the Fastness of Dyestuffs to Light	J. S. C. I., XXVII, 1056
1908	Bul. Soc. Ind. Mul., 70-320	Scheurer Schoen and Wild	The Application of Actinometry as a Measure of Resistance of Colors to Light	C. A., 2-710
1909	Rev. Gen. Mat. Color, 13-73	Bechtel	Use of the Prussiates of Iron in Measuring the Fastness of Dyes to Light	C. A., 3, 2873
1909	Rev. Gen. Mat. Color, 12-288	F. Berga	Fastness of Indigo	C. A., 3, 1691
1909	Rev. Gen. Mat. Color, 12-289	A. Bolis	Fastness of Dyes to Light	C. A., 3, 1691
1910	Am. Silk J., 29-52	F. Dannerth	Dye Permanency	C. A., 4, 2734
1910	Rev. Gen. Mat. Col., 14-193	P. Dosne	Study of a Method of Determining the Fastness of Colors to Light	C. A., 5, 200
1910	Mul. Soc. Ind. Mul., 80-332	P. Dosne	Means of Estimating Qualitatively and Quantitatively the Degradation of a Color Exposed to Light	C. A., 5, 1998
1910	J. Soc. D. & C., 25, 276 and 304	K. Gebhard	The Action of Light Upon the Fastness of Dyestuffs	C. A., 4, 385
1910	Z. Angew. Ch., 22, 1890	K. Gebhard	The Action of Light on Dye Systems	C. A., 4, 1682
1910	J. Soc. Dy. Col., 26-173	K. Gebhard	Action of Light on Dyed Shades and Standard Method of Testing	C. A., 4, 3005
1910	Mitt. Kgl. Mat. pr. 1910, sup. No. 1, 1-18	P. Heermann	Testing Fastness to Washing of Washable Colors	C. A., 5, 3517, J. C. I., 30-20
1910	Text. Farb. Ztg., 7, 457	K. Immerheiser	Fastness of Coal Tar Colors	C. A., 4, 250
1910	Z. Agnew. Ch., 23, 1206	P. Kraus	Sensibility of Coal Tar Colors to Light	V. A., 6, 155
1911	Elsassisches Textiblät, 1911, 257	E. Grandmougin	Fastness of Colors	.....
1911	Farb. Ztg., 22, 6 and 26	K. Gebhard	The Establishment of a Uniform Method for Testing the Light Fastness of Colors	C. A., 5, 1518
1911	Farb. Ztg., 22, 209	V. Klemperer	A Uniform Method for Testing Light Fastness	C. A., 5, 3626
1911	Chem. Ztg., 35-741	K. Gebhard	Uniform Testing Methods in the Textile Industry	C. A., 5, 3159
1911	Z. Angew. Ch., 24, 1302	P. Kraus	Proposed Scale for Measuring the Action of Light on Dyes According to Bleach Hours	C. A., 6, 1068
1911	Farber-Ztg., 1911, 118	F. Eppendahl	The Question of Normals of Fastness	Z. Angew. Ch., 24-1294
1911	Z. Angew. Chem., 24, 1807	K. Gebhard	Criticism of P. Kraus (same J., 24, 1302)	C. A., 6, 1069
1911	Z. Angew. Ch., 24, 1809	P. Kraus	Defense of Above	.....
1911	Z. Angew. Ch., 24, 1856	K. Gebhard	Reply to Above	.....
1911	Z. Angew. Ch., 24, 2426, Ch. Ztg., 36-380	K. Gebhard	Measuring Action of Light on Dyes (criticism of Kraus' method)	C. A., 6, 2317
1911	Bul. Soc. Ind. Mul., 80, 324-31	A. Scheurer	Exposure of Cotton Dyes to Sunlight and Under Mercury Arc	C. A., 5, 1998
1912	Technique Moderne, 4, 407	E. Grandmougin	Fastness	.....
1912	Farb. Ztg., 1912, 514	F. Eppendahl	Fastness to Washing and Its Testing	
1912	8th Int. Cong. Appl. Chem., 20-91	Bancroft, Elsenhart and Grant	Rapid Testing of Dyes and Pigments	C. A., 6, 3189
1912	Farb. Ztg., 23, 515-6	W. Kind	Testing Fastness to Weather at Different Seasons	C. A., 3543
1912	Z. Angew. Ch., 25-2193	P. Kraus	Light Fastness of Pigments from Coal Tar Dyes	C. A., 7, 901
1913	J. Phys. Chem., 16-546	Bancroft, Elsenhart and Grant	Rapid Testing of Dyes and Pigments	C. A., 7, 2309
1913	Z. Angew. Ch., 26, 74	P. Kraus	Light Fastness of Pigments from Coal Tar Dyes	C. A., 7, 1620
1913	Ztg. Angew. Ch., 26-79	K. Gebhard	Rapid Testing of Light Fastness of Dyes and Pigments	C. A., 7, 1613
1913	Z. Angew. Ch., 26-162	F. Eppendahl	The Movement for Fast Dyeings and the Dyeing of Fast Colors	C. A., 7, 1978
1914	Farb. Ztg., 25-45			
1914	Ch. Ztg., 25	A. Kertess	Testing Fabrics for Fastness to Wearing	.....
1914	Farb. Ztg., 24, 366-70	E. König	Influencing the Light Fastness of Dyeings	C. A., 8, 1674
1914	Z. Angew. Ch., 27, Aufsatz, 57-63, Chem. Ztg., 38-154		Official Report of German Committee on Fastness	C. A., 8, 1348 J.S.C.I., XXXIII, 248
1915	J. Soc. Ch. Ind., 34, 598-9	A. Sorker	Use of Knecht's Process for Determining Fastness to Light and Other Agencies	C. A., 9, 3364
1915	Trans. Am. Elect. Chem. Soc., 28-371, Chem. Eng., 22-111	W. R. Mott	Use of the Flaming Arc in Paint and Dye Testing	C. A., 9, 3130

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

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## THE DYE INVESTIGATION

**A**FTER innumerable false starts which kept those interested more or less on the qui vive, the so-called dye lobby investigation of Senator King is at last apparently slated to get under way. At the present writing it has just been postponed for the third time, but will begin, according to present plans, Tuesday morning, February 14, at which time the hearing of witnesses by Senators Shortridge, Ernst and Reed, composing the investigating subcommittee of the Senate Judiciary Committee, will be commenced. How long the investigation is likely to last, or how deeply it may find itself required to delve into the legislative situation in order to gain the information desired by its instigator, there is no telling. But there is one development which may with confidence be depended upon to materialize, namely: that there will be connected with and involved in the investigation a certain element which will do all in its power to see that every possible disclosure, no matter how unimportant, shall be interpreted in the most sensational manner and blazoned broadcast.

This tendency has already been well shown by the tactics of Senator Moses on the day of passage of the King resolution. Toward the conclusion of a rather fiery speech in denunciation of the "dye monopoly," the New Hampshire Senator turned dramatically and pointed to a large chart which he had caused to be suspended from the Senate Gallery. This ingenious work had for its center an oval containing the name "DU PONT," which was surrounded by many squares and rectangles labeled "Chemical Foundation," "American Dyes Institute," etc. From the central oval there were lines radiating to the various smaller figures, and these themselves were joined to one another by additional lines which crossed and recrossed to form a perfect network.

It was the contention of Senator Moses that this chart showed the existence of a dye monopoly!

Although subsequently printed in the "Congressional Record" at the author's request, even the more sensational dailies engaged in supporting his activities did not see fit to reproduce it for the benefit of their many readers. It may possibly be that they regarded it as bordering too closely upon the libelous. Certain it is that it was viewed by many at that time as being somewhat childish, for it takes considerably more than the drawing of lines to establish such relationships as Senator Moses would have us believe they indicated. But it served a useful purpose in being, perhaps, as truly illustrative of the underlying motives and desires animating this investigation as anything well could be.

One well-known news agency stated in one of its reports that Department of Justice officials have intimated they may warn all prospective witnesses that anything they say may be used against them. And it is said that Senator King will ask for the calling of representatives of the American Dyes Institute, the Textile Alliance, the Chemical Foundation, the newly organized Synthetic Organic Chemical Manufacturers' Association, E. I. du Pont de Nemours & Co., and others. Perhaps the general attitude of the dye industry toward the investigation may be found summarized in communications recently sent to Senator Shortridge, chairman of the subcommittee. A telegram from Irene du Pont, for instance, was as follows:

"Please say to your committee at its meeting to-day that the Du Pont Company is most anxious to appear and answer the charges made against it. All this company's acts in the campaign to have enacted legislation for the preservation of the new American dyes industry will bear the closest scrutiny. Our records are at your disposal, and any officials or employees whom you wish to hear are at your call. We urge that your investigation go deeply into all the activities undertaken to perpetuate a foreign monopoly in the sale of dyes in this country, as well as into the effort of American manufacturers to make this country chemically independent."

Again, there is the letter to Senator Shortridge from R. C. Jeffcott, president of the American Dyes Institute. This is also of interest as reflecting the sentiments of the industry. It states:

"In the investigation which your committee is about to begin under Senate Resolution No. 77, the American Dyes Institute and its members wish to let you know that they want to co-operate with you and facilitate your labors in every way. The resolution is comprehensive, and those engaged in the dye industry of the country welcome a most thorough and impartial examination of all the questions covered by it.

"The members of the Institute are active business men, concerned with the affairs of their companies, but they want you to understand that they will be entirely at your disposal, and will without formal legal process of any character make themselves available to you, together with any records which you may desire



to be produced at any time that they may be given notice as to whom and what you desire."

Those are the sentiments of the industry, and they have not changed in the least since the King resolution was made the subject of a debate in the Senate. Moreover, if the investigation is prosecuted vigorously it may serve to reveal facts about the real condition of the industry which may surprise not a few of the opposers of protection. It should direct attention, for one thing, to the unhealthy intratrade competition which at present threatens to harm the industry almost as much as the three-year legislative delay. It should bring out strongly the fact that instead of a trust we have a well-nigh ruinous price war in the American dye industry. And, although this fact will be no real news to Senators King and Moses—nor to Representative Frear—it should at least have the effect of limiting their "monopoly" oratory in connection with this particular subject in future debates.

It would be interesting, indeed, to know the exact measure of Senator King's eagerness to make the investigation a searching one, as compared with his eagerness at the time when he presented his resolution. Certain it is that this eagerness has been reduced by at least whatever proportion of political scheming may have figured in his original desire. That proportion, were it high or low, was effectually wiped out when Senator Frelinghuysen shrewdly checkmated the King move by adding his amendment extending the scope of the investigation to the activities of importers and others working against the Longworth plan. Senator King would scarcely have dared withdraw his resolution at any time, much less at the last minute, and so was forced to watch it become a double-edged weapon quite as likely to cut into the King ranks, if wielded strenuously, as into the protection forces. The Senate having acted, an investigation of some kind must be held. But just how actively its instigators will now urge it forward is a question in the minds of many observers.

A press dispatch states: "An official who is prominent in the activities to expose alleged irregularities in disposing of alien property said the sale (of the 4,500 German patents) to the Chemical Foundation should be compared with the sale of the Bayer Company, of New York, which was sold to the Sterling Processes Company of Cleveland for \$5,310,000. The estimated value of the machinery, plants and appurtenances of this company was \$750,000. The company owned and was using 1,000 patents and it was agreed that these patents were worth at least \$4,560,000. If these patents were worth that amount to the purchasers, it is believed by some that the Chemical Foundation got its 4,500 patents too cheaply."

This is just one more example of the manner in which the public, knowing nothing of the Chemical Foundation, can be led to believe, by inference, almost anything a shrewd publicity agent chooses to have it believe. Now, merely because 1,000 given patents hap-

pen to be worth more than four million dollars, that is no proof—or even argument—that 4,500 other patents are worth a greater sum. Neither is it proof that the latter patents are *not* worth a greater sum. It simply does not mean anything at all. Note particularly the phrase "and was using." Tried and tested patents *in use* by a firm which spends millions of dollars to advertise the products of those patents are a very different sort of proposition from patents not in use in this country, particularly when the possible use of many of them is highly problematical owing to omissions in specifications. Anyone knows, who stops to think, that the files of the Patent Office are clogged with thousands of patents which literally are not worth, to anyone, the paper they are printed upon. But the public, in the aggregate, rarely stops to think in a matter of that kind, depending, instead, upon the newspapers to provide a correct interpretation of the facts.

Again, the assumption would naturally be that the Chemical Foundation is a manufacturing concern, whereas it is not a business enterprise at all. It will be recalled that its capital was fixed at \$500,000, of which \$250,000 was paid for the patents and \$250,000 retained as a working capital. Its purpose provided for "holding the patents as a trustee for American industry, for the Americanization of such institutions as may be affected thereby, for the exclusion or elimination of alien interests hostile or detrimental to the said industries, and for the advancement of chemical and allied science and industry in the United States." The voting stock of the corporation was placed in a voting trust, of which the trustees were George L. Ingraham, Otto T. Bannard, Cleveland H. Dodge, Benjamin H. Griswold and Ralph Stone. The charter of the organization was so framed that under the patents non-exclusive licenses only could be granted on equal terms to all proper applicants, and were obliged to be granted to the United States *free of cost*. Of the \$500,000 capital, \$400,000 was made 6 per cent cumulative preferred stock and \$100,000 common stock, also limited to 6 per cent dividends. The charter further provided that surplus income was to be used for the retirement of the preferred stock, and thereafter for the advancement of chemical and allied science and industry.

At the time of its organization, A. Mitchell Palmer, then Alien Property Custodian, stated in explanation of the procedure adopted: "The price paid for the patents was necessarily determined somewhat arbitrarily; the great majority of the patents were presumably valueless. The value of the remainder was entirely problematical and impossible to estimate. Substantially the entire industry having combined for the purpose of this purchase, it would have been impossible on public sale to find as a bidder any legitimate manufacturer. No other bidder could, therefore, have been found on public sale except some speculative individual who might have bought them for purposes practically amounting to commercial blackmail. The combination was not objectionable to public policy, since

it was so organized that any genuine American, whether a stockholder in the company or not, could secure the benefits of the patents on fair and equal terms."

Now that the investigation is really about to start, it is well to bring up these facts again and give them some attention. Presumably they will all be brought out during the course of the questioning, and will be made the subject of comment in the press. Those who are aware of them in advance will be all the more interested, it may be assumed, in the subsequent fate of Senator Moses and his chart, should that gentleman attempt to bring it into the proceedings.

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#### RESEARCH AND THE A. A. T. C. C.

**I**N a recent editorial in the columns of the "Journal of Industrial and Engineering Chemistry," organ of the American Chemical Society, Harrison E. Howe states: "There is at least one textile mill in America which has continued to run at capacity. It has experienced no season of slack orders and it has made no reduction in its scientific staff. The president of this mill—Joseph Bancroft & Sons Company—tells us that his success has been due to the fact that his scientists by continued research have kept his mill four or five years ahead of the procession. He is producing materials that have no competition. He is offering uniquely dyed fabrics which are in a class by themselves and when there is a buyers' market, a mill in this position has an unusual advantage. The president of this mill proposes to increase research, for he knows he cannot possibly afford to curtail it."

This is but another instance of the benefits reaped by those in the textile industry who have accorded American chemistry its due and employed the great power of competent research for their own advantage. As compared with many other industries which might also be benefited by research, the textile industry is not so far behind, but when gauged by its peculiar susceptibility to this force, it is still far from realizing the ideal state.

Herein is one of the most important reasons for the existence of the American Association of Textile Chemists and Colorists. At the second Research Committee meeting of that organization, attention was called to the fact that the opinion had been expressed by a number of manufacturers, not members of the Association, that a decided prestige would accrue to the Association if its members could define fastness tests for dyestuffs and finished fabrics, and have them accepted as official. It was the opinion of the Council that more could be accomplished by confining the efforts of the organization temporarily to the washing of cotton, and it was decided first to formulate provisional methods which could be published and ultimately adopted as official after time had been given for criticism. Such a method, it was brought out, should be accompanied by the statement that it was to be employed only on the type

of fabric designated, and not upon any other fabric.

Thus, the advantages of having, within the industry, an official body composed only of men of the highest standing and ripe experience, become apparent. The first consideration in the straightening out of the seemingly never-ending fastness controversy between dye manufacturer, textile manufacturer and chemist is the arbitrary designation of a common ground of phraseology whereon all may meet and converse with perfect understanding of what is meant. Hitherto there has been no group with sufficient magnitude or authority to define such grounds. Now a definite code can be established the various terms comprising which can mean respectively, one, and only one, degree of "fastness" upon a single classification of fabric. Having determined among themselves exactly what is meant by fastness under given circumstances, the researchers can then work out standard formulae to meet the requirements of the code. Goods need then no longer be purchased with the eyes shut, or at least half shut, to their qualifications for the fulfilment of certain purposes, and members of the A. A. T. C. C., interested both as chemists and as manufacturers, should have no trouble in reaching an agreement which all will respect.

Because of the undoubted additional prestige which the organization will gain from straightening out the present tangle, its influence should become great enough to make its opinions as to the high general value of both individual and co-operative research received with greater seriousness, and its ability to circulate these opinions increased, so that it may become a most powerful factor in hastening the approach of that day when the true value of research to the textile industry shall have become fully understood.

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#### Dr. Herty's Jersey City Address

Additional Correspondence from Seebohm, of Griesheim-Elektron Works, and from Dr. Ernster

**A**DDITIONS to the correspondence provoked by Dr. Charles H. Herty's Jersey City address, which was printed in *The Reporter* of December 12, have arrived in the shape of a communication from the Chemische Fabrik Griesheim-Elektron, Frankfurt a.M., over the signature of Dr. Seebohm of that firm, and another letter from Dr. Nicolas Ernster. The former letter refers to the article of December 12, and reached this office after Dr. Ernster's denial and Dr. Herty's reply thereto had been printed in the last issue of this journal, January 30. It was addressed to Paul Nobbe, of the Commonwealth Color & Chemical Company, who had forwarded the issue of December 12, containing the Herty speech, to Dr. Seebohm in Germany. The facts upon which the various communications are based were given in the January 30 issue, and it remains only to print the letters themselves, which are self-explanatory:



[Letterhead of the Commonwealth Color  
& Chemical Co., Brooklyn, N. Y.]

February 6.

To the Editor of The REPORTER:

In your issue of the AMERICAN DYESTUFF REPORTER of January 30 there appears an article under the heading "Dr. Herty's Jersey City Address—A Denial and a Reply."

I think that in justice to the foreign gentlemen, who are not here to defend themselves, you should print the letter which we enclose herewith, addressed to the writer, dated January 7.

PAUL NOBBE.

[Letterhead of Chemische Fabrik Griesheim-  
Elektron, Frankfurt a.M.]

To Mr. Paul Nobbe:

January 7.

Mr. Seebohm asks us to thank you for your letter of the 21st ult. and for sending us the copy of the AMERICAN DYESTUFF REPORTER of December 12.

We have heard of this matter before and beg to say that the statements alleged to have been made by Mr. Von Weinberg and Mr. Seebohm are a *pure and malicious fabrication* and that not one single word of it is true.

We presume that the originator of this report refers to an interview our Mr. Seebohm had with some American gentlemen some months ago, and that for certain purposes the facts discussed have been wilfully and maliciously distorted.

(Signed) CHEMISCHE FABRIK GRIESHEIM-ELEKTRON.  
SEEBOHM,  
p.p. O. S. S.

Following the report of the above, in which the italics are the correspondent's, another letter was received from Dr. Ernster in which the latter again repeats his denial of statements attributed to him, and declares that so far as he is concerned the incident is closed. It is not the policy of The REPORTER, it may be added, to substitute blanks for proper names, but since it was begun in the present case we must permit our correspondents to follow their own desires. Dr. Ernster's letter follows:

[North Billerica, Mass.]

February 7.

To the Editor of The REPORTER:

In answering my letter printed in your edition of January 30, Dr. Herty publishes a communication from Mr. Zinsser in which he states the following:

"I dislike very much getting into a discussion with the Doctor, but as he questions the truthfulness of the statements made to you, I wish to repeat again the conversation he had with my son, the head of our dye sales organization, and a third person.

"Dr. Ernster did state that the German manufacturers, among whom he mentioned Mr. Seebohm, had complete records of the activities, yields and methods of the American dyestuff and chemical plants. In this connection he mentioned that the person with whom he spoke took from his files a paper from which he read the details.

"He furthermore stated that his informant told him that, in case of an embargo, the Germans would at once begin to build, and that they know the exact cost of the plants in this country and could duplicate them at a small fraction of their original cost. This information was given as coming either from von Weinberg or one of his assistants." Etc.

After reading this I submitted the whole correspondence to the fourth person present, Dr. ——— [Note—This is the "third person" referred to in Mr. Zinsser's letter.—Ed.], and as answer received the following letter:

"Dear Dr. Ernster:

"I was very surprised when I heard that your private conversation with Mr. J. S. Zinsser, our friend Mr. Lehmann, and myself, was in part inaccurately published without your knowledge and consent.

"Our friends misconstrued, evidently, some important parts of your discussion, in which you expressed your personal views and opinions of the industrial conditions abroad and in this country.

"The misunderstanding must have come through the fact that you had mentioned during the conversation your visit to the heads of the German dyestuff people, and that they understood the following arguments, as originated by those persons, which is a pure invention. I will not go into details like the legend of Mr. Seebohm's 'filed records,' or the embargo question, etc., and I hope this will help to clear up the truth about this conversation.

"Dr. ———."

So far for the third person present during our conversation. As for myself, I refer Dr. Herty and Mr. Zinsser again to my letter of January 30, and insist once more that none of these statements was made to me by the German manufacturers, and I certainly did not say in our conversation that they were made to me.

I wonder why Mr. Lehmann signed these statements? If he had remembered our private conversation just before and after our meeting with Mr. Zinsser, Jr., he probably would have hesitated before doing so. If he wishes me to remind him, I will gladly do so privately.

So far as I am concerned, I consider the incident closed.

DR. NICOLAS ERNSTER.

## Foreign Dyes Licensed by Treasury Department for January Import

Switzerland Records Tremendous Decline; England Gains; Germany Falls Off, and France Sends None

**L**ICENSED imports of dyestuffs, which totaled 201,221 pounds, showed a further decline as against the 308,787-pound total for December, the 520,212 pounds of November, and the 768,358 pounds of October.

The German total fell off from the 149,365-pound contribution of December, and in January sent us only 117,275 pounds. This figure is large, however, as compared with Germany's 92,864 pounds of November, but small in comparison with her 418,344 pounds of October. Once more there were no licensed importations from France, while England showed a gain by sending here 46,550 pounds in January as against 38,720 of December. Switzerland showed the greatest loss, sending but 37,396 pounds in January as against 120,702 in December.

Following is the complete list giving the types and quantities of dyestuffs for the importation of which into the United States licenses were granted by the Treasury Department, Division of Customs, Dye and Chemical Section, during January. This tabulation is being issued by the American Dyes Institute, and it is announced that anyone interested in the manufacture of dyestuffs who has not received a copy may obtain one by application to that organization's headquarters, 320 Broadway, New York City.

An appended note by the Treasury Department states: "Licenses shown by this list to have been issued for particular commodities must not be considered as a precedent or assurance that favorable action will be taken on future applications for similar commodities. The Treasury Department, Dye and Chemical Section, announces in special cases that it is its practice to consider any special evidence that may be submitted by manufacturing consumers of dyestuffs tending to prove that the American commodity, while satisfactory in general or for some lines, will not meet the requirements as to quality or adaptability for particular manufacturing purposes."

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Aceto Purpurine 8B.....	550	....
Acid Alizarine Black R.....	1,300	....
Acid Alizarine Gray G.....	600	....
Acid Anthracene Brown RH Extra..	300	....
Acid Anthracene Red 5BL.....	250	....
Acid Pure Blue R Supra.....	....	110
Acid Rhodamine BG.....	5	....
Acid Rhodamine R.....	....	220
Acridine Orange .....	....	501
Algol Blue 3G Powder.....	10	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Algol Blue 3G Paste.....	50	....
Algol Blue K Powder.....	10	....
Algol Blue K Paste.....	450	....
Algol Brilliant Violet R Paste.....	10	....
Algol Brown G Powder.....	185	....
Algol Brown R Powder.....	422	....
Algol Corinth R Paste.....	510	....
Algol Corinth R Powder.....	10	....
Algol Green B Powder.....	10	....
Algol Olive R Powder.....	10	....
Algol Orange R Powder.....	10	....
Algol Orange R Paste.....	225	....
Algol Red B.....	50	....
Algol Red 5G Powder.....	10	....
Algol Yellow R Powder.....	100	....
Alizarine VI Extra Pure 20%.....	450	....
Alizarine Astrol B.....	125	....
Alizarine Black B.....	10	....
Alizarine Blue S Powder.....	2,000	....
Alizarine Blue SAWSA.....	1,550	....
Alizarine Blue SAE.....	100	....
Alizarine Blue SKY.....	125	....
Alizarine Blue WS.....	50	....
Alizarine Blue Black B Powder....	805	....
Alizarine Blue Black 3B.....	500	....
Alizarine Cyanine Green E.....	200	....
Alizarine Cyanine Green G Ex. Pdr..	1,980	....
Alizarine Cyanine Green 3G Powder	134	....
Alizarine Emeraldole G Powder....	100	....
Alizarine Green CE.....	250	....
Alizarine Indigo B.....	500	....
Alizarine Indigo G.....	500	....
Alizarine Irisol R.....	25	....
Alizarine Orange AO 20% Paste (from England 200 lbs.).....	....	....
Alizarine Orange R Powder.....	100	....
Alizarine Red .....	....	4,400
Alizarine Red S.....	100	....
Alizarine Red SWB.....	100	....
Alizarine Red W Powder.....	3,655	....
Alizarine Red YCA 20% Paste (from England 100 lbs.).....	....	....
Alizarine Rubinoles 3G.....	500	....
Alizarine Rubinoles 5G Powder....	200	....
Alizarine Rubinoles R Powder.....	2,025	....
Alizarine Saphirol B.....	800	....
Alizarine Saphirole SE Conc.....	285	....
Alizarine Sky Blue B Powder.....	1,680	....
Alizarine Viridine FF Paste.....	2,000	....
Anthracene Acid Black ST.....	500	....
Anthracene Blue SWGG Ex. Powder	200	....
Anthracene Blue WR Double Paste.	20,000	....
Anthracene Chrome Brown EB....	50	....
Anthraflavone G Paste.....	250	....
Anthraquinone Green GXNO.....	250	....
Azo Acid Black B.....	400	....
Azo Carmine GX.....	1,510	....



Designation of Dye	Germany (lbs.)	Switz. (lbs.)	Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Benzo Fast Black L.....	100	....	Cibanone Green B Paste Pat.....	....	110
Benzo Fast Blue 4GL.....	1,000	....	Coriphosphine OX Extra.....	250	....
Benzo Fast Red 8BL.....	1,750	....	Cross Dye Green B (from England 14,000 lbs.) .....	....	....
Benzo Rhoduline Red B.....	450	....	Cross Dye Green 2G Conc (from England 4,050 lbs.).....	....	....
Brilliant Acid Blue V.....	1,000	....	Crystal Violet Extra.....	1,000	....
Brilliant Benzo Fast Violet B.....	50	....	Cyananthrol BGA .....	10	....
Brilliant Benzo Fast Violet BL.....	225	....	Cyananthrol BGAO .....	448	....
Acridin Red 3B.....	50	....	Cyanine B .....	200	....
Algol Red R Extra.....	175	....	Cyanole FF .....	1,600	....
Algol Red R Extra Paste.....	25	....	Ciba Scarlet G Extra.....	....	550
Algol Red 2F Paste.....	500	....	Cibanon Orange R.....	....	550
Anthraquinone Violet 6.....	100	....	Diamine Azo Scarlet BBL Extra...	100	....
Anthraquinone Blue SR Extra.....	100	....	Diamine Catechine B.....	....	320
Brilliant Cresyl Blue 2B.....	50	....	Diamine Catechine B.....	20	....
Brilliant Benzo Fast Violet 4BL....	50	....	Diamine Catechine G.....	125	....
Brilliant Benzo Fast Violet 2R....	50	....	Diamine Catechine 3G.....	25	....
Brilliant Benzo Violet 4BL.....	50	....	Diamine Fast Blue FFB.....	100	....
Brilliant Benzo Violet 2RL.....	200	....	Diamine Fast Brown GB.....	50	....
Brilliant Fast Blue B.....	75	....	Diamine Fast Brown R.....	50	....
Brilliant Fast Blue GG.....	50	....	Diamine Fast Orange ER.....	200	....
Brilliant Germaine 2BN.....	250	....	Diamine Scarlet B.....	100	....
Brilliant Indigo B Paste.....	300	....	Dianil Developer G.....	100	....
Brilliant Indigo G Paste.....	200	....	Dianil Developer 3G.....	100	....
Brilliant Milling Blue B..	40	....	Diazo Brilliant Black B.....	500	....
Brilliant Milling Orange GR.....	25	....	Diazo Brilliant Scarlet S4B.....	50	....
Chinoline Yellow .....	500	....	Diazo Brilliant Black 6B Extra.....	100	....
Chinoline Yellow KT Extra Conc...	300	....	Diazogene Orange GR Extra.....	25	....
Chloramine Red 8BS.....	600	....	Diphenyl Chlorine Yellow FF Supra	....	500
Chlorantine Fast Blue BL.....	....	2,200	Direct Brown 2G.....	....	1,386
Chlorantine Fast Blue 2GL.....	....	530	Euchrysine GRNTN .....	1,025	....
Chlorantine Fast Blue RL.....	....	1,971	Erika B Extra.....	100	....
Chlorantine Fast Bordeaux 2BL....	....	1,100	Erika 2GN .....	25	....
Chlorantine Fast Brown 3GL.....	....	211	Erio Carmine 2BC.....	....	110
Chlorantine Fast Brown RL.....	....	770	Euchrysine RRDx .....	500	....
Chlorantine Fast Gray GL.....	....	110	Fast Acid Marine Blue HBBx.....	500	....
Chlorantine Fast Red 7BL.....	....	1,696	Fast Mordant Blue B.....	4,000	....
Chlorantine Fast Violet BL.....	....	110	Fastigene B .....	10	....
Chlorantine Fast Violet 4BL.....	....	330	Flavinduline O .....	25	....
Chlorantine Fast Violet RL.....	....	101	Gallo Indigo Blue S Powder.....	500	....
Chlorantine Fast Violet 2RL.....	....	211	Fast Mordant Yellow G.....	100	....
Chlorantine Fast Yellow 4GL.....	....	132	Hansa Yellow 5G.....	100	....
Chlorantine Fast Yellow RL... ..	....	310	Helindone Brown 3GN Paste.....	25	....
Chromazan Brilliant Blue G.....	20	....	Helindone Pink AN 10% Paste.....	50	....
Ciba Blue 2B Powder.....	....	798	Helindone Pink AN Paste.....	30	....
Ciba Blue 2BD Paste.....	....	440	Helindone Pink B Extra.....	25	....
Ciba Blue 2BD Paste Pat.....	....	440	Helindone Pink BN 10% Paste.....	600	....
Ciba Blue G Powder.....	....	50	Helindone Pink R Extra Paste.....	10	....
Ciba Bordeaux R.....	....	1,100	Helindone Pink BN Paste.....	50	....
Ciba Orange G 10% Paste.....	....	55	Helindone Pink R Extra.....	25	....
Ciba Pink BG Powder.....	....	11	Helindone Rose R Extra Paste.....	800	....
Ciba Red G Powder.....	....	220	Helindone Violet R Paste.....	25	....
Ciba Scarlet 20% Paste.....	....	220	Helio Fast Blue SL Conc.....	6,600	....
Ciba Scarlet G Powder.....	....	245	Hydron Blue R Powder.....	200	....
Ciba Scarlet G 20% Paste.....	....	770	Hydron Blue R 30% Paste.....	500	....
Ciba Violet B Paste.....	....	6,600	Hydron Blue R.....	25	....
Ciba Violet B Powder.....	....	220			
Ciba Violet B Powder Pat.....	....	440			

Designation of Dye	Germany (lbs.)	Switz. (lbs.)	Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Hydron Bordeaux B Paste.....	25	....	New Methylene Blue N.....	287	....
Hydron Bordeaux R Paste.....	25	....	Nile Blue BX.....	10	....
Hydron Pink FB Paste.....	35	....	Oxamine Light Brown G.....	500	....
Hydron Pink FF Paste.....	35	....	Oxamine Red 3BX.....	100	....
Hydron Yellow NF Paste.....	25	....	Patent Blue AS.....	....	1,300
Immedial Violet C.....	100	....	Patent Phosphine G.....	....	499
Anthraflavone GC Paste.....	10	....	Patent Phosphine M.....	....	121
Indanthrene Blue GC Powder.....	275	....	Patent Phosphine R.....	....	110
Indanthrene Blue GCD Dbl. Paste..	2,100	....	Peacock Blue Lake.....	510	....
Indanthrene Blue 2GSP Dbl. Paste..	500	....	Pluto Brown 2G.....	100	....
Indanthrene Blue 3G Paste.....	10	....	Pyramine Orange RR.....	35	....
Indanthrene Blue 3G Dbl. Paste....	10	....	Wool Black GR.....	1,000	....
Indanthrene Blue RS Dbl. Paste....	500	....	Pyrazole Orange G.....	....	3,000
Indanthrene Blue RS Triple Powder	1,888	....	Pyrogene Direct Blue BL.....	....	400
Indanthrene Blue RSP Triple Pdr..	1,260	....	Pyrogene Green 3G.....	....	550
Indanthrene Blue RZ.....	2,500	....	Pyrogene Green 3G 270%.....	....	242
Indanthrene Blue WB Powder.....	50	....	Rhodamine 6GDN Extra .....	625	....
Indanthrene Blue WBO Powder....	100	....	Rosanthrene Orange R.....	....	176
Indanthrene Brown B Dbl. Paste... 3,434		....	Rosinduline 2B Bluish.....	1,102	....
Indanthrene Claret B Extra Paste... 242		....	Sericose L .....	100	....
Indanthrene Golden Orange G Dbl.		....	Silk Blue IV.....	100	....
Paste .....	1,500	....	Thioflavine T .....	1,000	....
Indanthrene Golden Orange RRT		....	Thio Indigo Pink RN Extra Paste..	200	....
Paste .....	4,087	....	Thio Indigo Rose BN Extra Paste..	1,120	....
Indanthrene Golden Orange RRT..	200	....	Thionol Brown O (from England		
Indanthrene Golden Orange RRT		....	4,000 lbs.) .....	....	....
Dbl. Paste .....	500	....	Thionol Brown R (from England 600		
Indanthrene Green B Dbl. Paste....	1,000	....	lbs.) .....	....	....
Indanthrene Pink B Dbl. Paste....	760	....	Thionol Green DY (from England		
Indanthrene Red B Extra .....	2,674	....	12,100 lbs.) .....	....	....
Indanthrene Red Violet RRN.....	510	....	Thionol Yellow 3RD (from England		
Indanthrene Ecarlet G Pst. or Pdr..	175	....	8,000 lbs.) .....	....	....
Indanthrene Violet BN Extra Paste.	1,510	....	Toluylene Fast Brown 2R.....	200	....
Indigo MLB6B Powder.....	200	....	Vat Pink R Extra.....	10	....
Japan Black Extra.....	100	....	Victoria Pure Blue BO.....	500	....
Kiton Fast Blue V Pure.....	....	220	Zambesi Pure Blue 4B.....	125	....
Lanasol Blue B.....	....	290	Brilliant Lake M.....	225	....
Lanasol Brown 2R .....	....	440	Celosia Lake B.....	225	....
Lithol Rubine 3B.....	20	....	Viridin Lake .....	610	....
Madder Lake (from England 3,000		....	Light Green SF Yellowish.....	22	....
lbs.) .....	....	....	Pure Soluble Blue.....	1,000	....
Madder Lake .....	350	....	Sulphon Azurine D.....	500	....
Madder Lake .....	333	....	Palatine Light Yellow RX.....	100	....
Methylene Heliotrope O Ex. Conc..	500	....			
Methyl Green Yellowish.....	2	....	Totals:		
Milling Yellow O.....	275	....	Germany .....	117,275	
Naphthamine Fast Black KSG Extra	25	....	England .....	46,450	
Naphthamine Fast Black KSV Extra	25	....	Switzerland .....	37,396	
Naphthamine Light Blue B.....	25	....			
Naphthamine Light Blue 4B.....	25	....	Grand Total .....	201,221	
Naphthamine Light Blue R.....	25	....			
Naphthamine Light Green G.....	25	....			
Naphthamine Fast Gray B.....	25	....			
Naphthamine Light Red 6B.....	25	....			
Naphthamine Light Red R.....	25	....			
Naphthamine Light Violet 2B.....	25	....			
Naphthamine Blue B.....	525	....			

The Federal Silk Hosiery Works, Inc., Brooklyn, N. Y., has been incorporated, under the laws of New York, to manufacture hosiery. The capital is \$10,000. Incorporators are: William Cooper, 401 Grand Street, New York; Ira Zuckerman, Brooklyn, and Helen Cooper, New York.



### DU PONT CHEMICAL FELLOWSHIPS RE-NEWED FOR COMING YEAR

E. I. du Pont de Nemours & Co. has authorized the continuance of Du Pont chemical fellowships in twenty colleges and universities throughout the United States for the scholastic year of 1922-1923. The total value of these is \$15,000. The fellowships are for postgraduate work and are placed in the institutions which have well established postgraduate courses.

The recipients are to be selected not by the company, but by the university authorities, the only condition made by the company being that the awards shall go to graduates who devote the major part of their time to the study of chemistry.

The object of the plan is to promote the study of chemistry and to assist deserving students, who have shown especial aptitude for chemistry, to pursue further work. This differs from the usual plan for industrial fellowships in that the company does not insist on the student carrying out an investigation on subjects in which the company is interested, but leaves him free, under the direction of his instructors, to follow whatever line of investigation seems to him most promising. The institutions which receive these fellowships are:

Brown University, Providence, R. I.; California Institute of Technology, Pasadena, Cal.; University of California, Berkeley, Cal.; University of Chicago, Chicago, Ill.; Cornell University, Ithaca, N. Y.; Delaware University, Newark, Del.; Harvard University, Cambridge, Mass.; University of Illinois, Urbana, Ill.; Johns Hopkins University, Baltimore, Md.; Lafayette College, Easton, Pa.; Massachusetts Institute of Technology, Boston, Mass.; University of Michigan, Ann Arbor Mich.; University of Minnesota, Minneapolis, Minn.; Ohio State University, Columbus, Ohio; Princeton University, Princeton, N. J.; University of Virginia, Charlottesville, Va.; University of Washington, Seattle, Wash.; University of Wisconsin, Madison, Wis.; Yale University, New Haven, Conn.; Columbia University, New York, N. Y.

For the past four years chemical fellowships and scholarships have been established in American institutions of learning by the Du Pont Company. The policy was adopted at the time of the war, when all chemical imports from Europe were shut off and the need for developing in this country a self-contained native chemical industry, the first requirement of which is large numbers of research chemists, was demonstrated.

The Viscose Corporation of Virginia, Roanoke, Va., has been incorporated to manufacture and deal in dry goods and fabrics of all kinds. The incorporators are: President, Dr. C. A. Ernst, Ridley Park, Pa.; secretary, Charles H. Hendrickson, Philadelphia, and Whitwell W. Coxe, Frank W. Rogers and Joseph H. Chitwood, all of Roanoke.

### DYERS AND CLEANERS SUPPORT "TRUTH-IN-FABRIC" BILL; WOULD RAISE STANDARDS OF DYEING

An organized campaign to protect the public in the purchase of clothes by a law similar to the pure food law has been started in Chicago, where delegates from every State in the Union and from Britain and Canada met last Monday in the Hotel La Salle for the eleventh annual convention of the National Association of Dyers and Cleaners. The members are pledging support of the French-Capper pure-fabric bill, now in Congressional committee, which would compel every manufacturer of woven fabrics to mark the selvedge edge, stating whether it is virgin wool or mixed with shoddy, and the percentage.

Arthur Berg, vice-president of the association, emphasized the point that when a dealer tells a customer a garment is wool he may be telling the truth, although much of that wool may be shoddy, and after it is worn a short time the garment looks like a "hand-me-down."

The delegates also planned to raise the standards of dyeing and cleaning all over the country, urging laws similar to those passed in Ohio and Indiana, governing the plants and equipment. The association has an insurance company which admits only members whose plants are of the standard type.

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### BYRON, HEFFERNAN & CO. ANNOUNCE CHROME BLACK SW AND CHROME FAST BROWN MP

Byron, Heffernan & Co., Elizabeth, N. J., have announced placing on the market two new colors, Chrome Black SW and Chrome Fast Brown MP.

Chrome Black SW is a new addition to American-made chrome colors. It is a straight color which can be dyed by the top chrome, bottom chrome or monochrome methods, and in each case leaves silk effects absolutely white. It possesses excellent solubility, dyes level and exhausts well from the dye bath, being only slightly affected by metals. It also possesses extreme fastness to light, perspiration and organic acids, as well as to washing, fulling and potting. This product should be of especial interest to dyers of men's silk stripe woolens who want a straight chrome black in order to get consistent, uniform results.

Chrome Fast Brown MP is also a very desirable color for dyeing silk-effect woolens, as it also can be dyed by the top chrome, bottom chrome or monochrome methods and leaves the silk absolutely white. This product yields a bright, deep shade of brown possessing extreme fastness to light, soaping, fulling, perspiration and potting. It likewise has unusual level dyeing properties and can be used in mixtures to make any shade of brown by the use of Chrome Green SE.

Product samples and dyeings may be obtained by addressing the company's works at Elizabeth, N. J.

## BAYER AND MONSANTO COUNSEL AT ODDS OVER "ASPIRIN" TRADE-MARK

Edward S. Rogers, Chicago, as counsel for the Bayer & Co., has addressed a letter to certain members of the wholesale drug trade in which it is demanded that the wholesaler desist from the use of the word "aspirin" altogether except in connection with company's product. The opinion and decree in the Bayer-United Drug Company suit is quoted apparently to substantiate a statement that "The Bayer Company, Inc., contends that the word 'aspirin' is its trade-mark which may not lawfully be applied to any substance not of its production in any dealings with any one." Legal proceedings against all who "violate this right" are promised.

Taking cognizance of this message, Paul Bakewell, as counsel for the Monsanto Chemical Works, has written Mr. Rogers, reviewing the decision in the Bayer-United Drug Company case and pointing out that in any event that decree is binding upon no one except the parties and privies to that suit. He goes further to point out that the claim of the Bayer Company to exclusive rights to the word "aspirin" is not in keeping even with the aforementioned decree, but is in fact contradicted thereby.

It will be recalled that the court refused to restrain the United Drug Company from using the name "aspirin" on certain packages of acetyl-salicylic acid tablets handled in dealings direct with the consumer.

## J. F. WARNER TO GIVE THIRTY-LECTURE COURSE ON BLEACHING, DYEING, PRINTING AND FINISHING AT N. Y. TEXTILE H. S.

Announcement is made of a course of thirty lectures on "The Bleaching, Dyeing, Printing and Finishing of Textile Fabrics," to be given at the New York Textile High School, by John F. Warner, of the Bronx Finishing Company, New York City. Mr. Warner, who is a charter member of the American Association of Textile Chemists and Colorists, is well qualified through broad experience in mill work to present the various angles of such a subject from both the theoretical and the practical viewpoint. While the course is designed principally for converters of textiles who desire a knowledge of fundamental dyeing, printing and finishing operations, the course is open to all students of such subjects living in New York. Full details may be obtained on application to the New York Textile High School, 124 West Thirtieth Street, New York City.

The Atteaux Dyestuff & Chemical Company, Toronto, Canada, sole agents for Farbenfabriken vorm. Friedr. Bayer & Co., announces that its principals "have devised a chemical process to render wool immune from the attack of moths without affecting its valuable properties in the slightest degree." The product is "Eulan F," referred to in the last issue of The Reporter by U. S. Consul Young.

## DYE LOBBY PROBE DEFINITELY SET FOR FEBRUARY 14

Public hearings on the methods alleged to have been employed in the several branches of the dyestuff industry to influence legislation are scheduled to commence on Tuesday, February 14. An informal meeting was held last week by Senator Shortridge of California, chairman of the investigating committee, and Senator Ernst of Kentucky, to listen to a statement by Senator King of Utah. Senator Reed of Missouri, the third member of the committee, was out of the city, but it was expected that he would return by the end of the week, permitting the investigation to get under way this week.

The attitude of the American Dyes Institute with respect to the inquiry was made known when a letter by President R. C. Jeffcott, addressed to Senator Shortridge, was made public.

This letter declared that members of the Institute were ready to leave their own affairs at any time in order to co-operate with the investigators, as did a telegram from Irene du Pont, president of E. I. du Pont de Nemours & Co.

Dr Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association, also sent a letter offering co-operation.

Senator King, sponsor of the resolution calling for an investigation of the dye industry, urged the committee to employ counsel to conduct the case. It is understood that the committee holds the opinion that it has not the authority to do so. Senator King has announced that in the absence of such authority he will appear before the committee as the prosecuting witness.

## TEXTILE ALLIANCE DISCONTINUES CON- TRACT AND ORDER FORM NO. 5

A recent announcement from the Textile Alliance to the trade reads:

"You are hereby advised that hereafter the use of Contract and Order Form No. 5 will be discontinued, and instead the acceptance of consumers' orders, on their own forms, will be confirmed by an acknowledgment containing the following provision:

The Textile Alliance, Inc., agrees to supply the dyes above if included in stocks on hand or if obtainable from reparation sources, but assumes no responsibility in the event of its inability to supply all or any part thereof.

"By inserting our serial numbers in their orders, purchasers will avoid unnecessary correspondence, delay, and the possibility of misunderstanding as to the colors wanted.

"With each order the purchaser should send the Textile Alliance, Inc., either the Import Permit of the



Treasury Department, or Consumer's Statement executed in duplicate; on receipt of the latter the Textile Alliance, Inc., will apply to the Treasury Department for the permit."

#### **F. W. PICKARD NOW DYE SALES DIRECTOR FOR DU PONT**

#### **M. R. Poucher and C. A. Meade Become Executive Staff Officials**

Development of American dyes has such an important part of the Du Pont Company's activities that the Dyestuffs Department has been so strengthened that its personnel can better handle the technical and commercial problems which the new industry presents.

F. W. Pickard, vice-president, has been relieved of his duties as a member of the Executive Committee to become General Manager of the department, with W. F. Harrington as assistant.

C. A. Meade, vice-president and former general manager, who has been connected with the Dyestuff Department since its organization, and also M. R. Poucher, former director of sales, have been made executive staff officials. Both are directors of the Du Pont Company.

Mr. Pickard has been connected with the Du Pont explosives and chemical industries for twenty years. On October 30, 1918, he was elected vice-president and director of the company and was made a member of the Executive Committee. Up to the time of the recent reorganization of the company, he represented the general sales activities on the Executive Committee.

Mr. Poucher has been associated with the dye industry for many years and is one of the best-known and most prominent men in the trade in America. When the Du Pont Company decided, in 1915, to go into the manufacture of dyes, he joined the organization and has been most actively engaged in the development of the industry in this country. He has been holding the title of director of sales but, because of the increasing need for his services in solving the development problems constantly arising, he has been relieved of the routine duties of that office and Cesare Protto, his assistant, has been made director.

A new article of manufacture has been improvised by the Societe d'Impression des Vosges et de Normandie. Cotton fabric is the medium employed, and this is treated so that it resembles wool or silk goods with a moire or iridescent effect. The cotton is woven on a jacquard loom so that it appears irregular and of a granite effect. The fabric is then printed in milleraies style, whereby a number of fine lines very close to each other are shown. The milleraies design may extend over the whole surface of the cotton, both back and front, or may occupy portions only. The lines may run in several directions, and the effect produced is of moire or iridescent wool or silk.

#### **S. D. PERLMAN NOW WITH BYRON, HEFFERNAN & CO.**

S. Donald Perlman has resigned from the Standard Color Company as New York manager of that concern to accept the position of director of sales with Byron, Heffernan & Co., Elizabeth, N. J., manufacturers of dyestuffs. Mr. Perlman is also president of the Dyetex Engineering Company, consulting dyestuff engineers, and is well known in the trade.

#### **DR. L. A. PRATT BECOMES DIRECTOR OF RESEARCH FOR MERRIMAC**

Announcement is made by the Merrimac Chemical Company, 148 State Street, Boston, Mass., to the effect that Dr. Lester A. Pratt, who has been in charge of the company's research laboratory for the past six years, has been made director of research for the firm.

#### **ATTRACTIVE PROGRAM ARRANGED FOR PHILADELPHIA SYMPOSIUM ON TEX- TILE MANUFACTURE AND ECONOMICS**

Many features of the textile industry are listed in the program covering the Symposium on Textile manufacture and Economics, to be held under the joint auspices of textile and engineering societies, on February 28, in Philadelphia.

Among the organizations participating in the symposium will be: American Cotton Manufacturers' Association, Converters' Association, Engineers' Club of Philadelphia, Franklin Institute of the State of Pennsylvania, Manufacturers' Club of Philadelphia, National Association of Cotton Manufacturers, National Association of Finishers of Cotton Fabrics, National Association of Wool Manufacturers, Pennsylvania Manufacturers' Association, Philadelphia Chamber of Commerce, Philadelphia Textile Manufacturers' Association, Philadelphia Textile School and the Philadelphia Alumni Association. The Philadelphia sections of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers will also attend the symposium.

The first event listed on the program is a morning inspection trip to the Philadelphia Textile School. Inspection trips will also be made to examine the manufacture of worsted yarns, upholsteries and pile fabrics, plushes, fancy cottons, dress goods, curtains, carpet mills, hosiery and knit fabrics.

The afternoon session will be called to order in the auditorium of the Manufacturers' Club of Philadelphia by William F. James, president of the Engineers' Club of Philadelphia. Open topical discussions will be on "Contrasts in British and American Textile Manufacturing Practice" and "Worsted Manufacture," which will be lead by William D. Hartshorne, Lawrence, Mass. Other topics will be wool sorting, scouring, worsted carding, combing, drawing, spinning, weaving, etc.

A discussion of cotton manufacture lead by Sydney B. Faine, Boston, will follow. Particular points of discussion will include: The picker room versus the blowing room, the card room, spinning, warp dressing and weaving.

Motion pictures of the woolen industry will follow, which will include "A Woolen Yarn," in one reel.

This is the story of the wool industry, from the shearing of the sheep to the finished product. The shearing, hand spinning and weaving operations were photographed in Vermont; the Indian spinning and weaving was done at Albuquerque, N. M.; the modern textile scenes were taken at the Grundy plant at Bristol, Pa.

Two reels, "In the Land of Cotton," will follow, which will be a story depicting the cotton industry from the planting of the seed to the finished fabric. The field scenes were made at the Delta & Pine Land Plantation, Scott, Miss., and the textile mill scenes at the Nashua Manufacturing Company, Nashua, N. H., respectively the largest cotton plantation, the largest cotton terminal and the largest cotton blanket mill in the world.

At a subscription dinner the toastmaster will be Charles J. Webb, president of the Philadelphia Textile Manufacturers' Association. Brief after-dinner speeches will be given by Alba B. Johnson, president of the Philadelphia Chamber of Commerce, and John E. Rousmaniere, New York, who will speak on "Co-operation in the Cotton Industry." W. Irving Bulard, vice-president of the Merchants' National Bank, of Boston, will speak on European conditions affecting our textile industry. Alber Greene Duncan, treasurer of Harmony Mills, Boston, will speak on European textile conditions and the world cotton conference at Manchester in 1921.

The evening technical session, to follow immediately after the dinner, will be in the auditorium of the Manufacturers' Club. Leo Loeb, member of the American Society of Mechanical Engineers, will address the meeting on problems and economics of the textile power plant.

Charles M. Mumford, Lockwood, Greene & Co., Boston, will speak on the mechanical handling of materials in textile plants.

The general committee in charge of the symposium is made up as follows:

The general committee in charge of the symposium is made up as follows:

Charles Penrose, chairman of committee, vice-chairman, American Society of Mechanical Engineers, Philadelphia section; Winston D. Adams, secretary, American Cotton Manufacturers' Association, Charlotte, N. C.; Samuel M. Fisher, secretary, Converters' Association, 291 Broadway, New York, N. Y.; Charles E. Billin, secretary of committee, secretary, Engineers' Club of Philadelphia, Philadelphia; Major R. B. Owens, secretary, Franklin Institute of the State of Pennsylvania, Philadelphia; Thomas F. Armstrong,

secretary, Manufacturers' Club of Philadelphia, Philadelphia; H. C. Meserve, secretary, National Association of Cotton Manufacturers, Boston, Mass.; H. E. Danner, secretary, National Association of Finishers of Cotton Fabrics, New York; and Paul T. Cherington, secretary, National Association of Wool Manufacturers, Boston, Mass.; W. W. Finn, secretary, Pennsylvania Manufacturers' Association, Philadelphia; N. B. Kelly, general secretary, Philadelphia Chamber of Commerce; J. Lewis Benton, managing director, Philadelphia Textile Manufacturers' Association; Dr. Edward W. France, director, Philadelphia Textile School; Bradley C. Algeo, president, Philadelphia Textile School Alumni Association; and R. B. Mateer, secretary, American Institute of Electrical Engineers, Philadelphia section, 1000 Chestnut Street, Philadelphia.

### NOTES OF THE TRADE

A quantity of dyed silks was destroyed in a recent fire which burned out the benzine shop of the United Piece Dye Works at Lodi, N. J.

The Eckhouse & Gerard Corporation has been organized to import, export and deal in chemicals, oils and allied products. The company has opened offices at 303 Fifth Avenue, New York. It is understood that some very attractive foreign connections have been secured, which will enable it to enter this market in an unusually favorable position on certain materials.

The textile firm of Kuhlmann et Cie., of Mulhouse, France, is about to raise its capital from 5,000,000 to 7,500,000 francs. The new shares will be issued at 200 per cent.

A study of the unsaturated hydrocarbons in industrial gases is being made by the Bureau of Mines with a view to developing economic methods of the manufacture of alcohols from them. Ethyl and propyl alcohols in particular are being sought. Gas distilled from a mixture of oil and coal at present is being studied in co-operation with the Trent Process Corporation, of Washington.

The Hope Textile Company, Providence, R. I., has been incorporated, under the laws of Rhode Island, with a capitalization of \$25,000, to engage in a general textile business, by Alfred G. Chaffee, John A. Bennett and Ira Marcus.

The Elm Converting Company, Philadelphia, Pa., has recently installed sufficient additional machinery in the winding department to double the capacity of the latter. The production has been increased to 30,000 pounds weekly.

The Jersey Knitting Company, Springfield, Mass., has been incorporated, under the laws of Massachusetts, with a capital of \$50,000, to manufacture, import and export



cotton, wool, silk, flax and textiles, by Theodore W. Ellis, president; John H. Mitchell, Springfield, treasurer, and H. Leonora Coolidge, director.

The Anchor Silk Throwing Company, Phillipsburg, Pa., has been incorporated for \$50,000. Robert B. Stauffer is one of the incorporators.

The Colored Worsted Mills, Providence, R. I., will begin production in the new addition to its plant in March. It is reported that the new annex will provide work for forty-five more operatives. Alfred H. Lister is president and buyer, and Benjamin F. Lister is treasurer and superintendent.

The British Industries Fair, which will be held in London February 27 to March 10, will exhibit chemicals for the first time. The display is to be a most comprehensive one of the products of the British chemical industry in all branches. At previous London fairs only drugs and druggists' sundries were exhibited, but the coming exhibition will include all chemicals ranging from fine chemicals for research and medicinal purposes to heavy chemicals.

The Allrite Knitting Mills Company has been incorporated, under the laws of Delaware, to deal in finishing, dyeing, in knitted goods, etc., with a capital of \$100,000. Incorporators are: T. L. Croteau, M. A. Bruce and C. H. Blaske, Wilmington, Del.

The spring meeting of the National Association of Cotton Manufacturers will be held at the Hotel Somerset in Boston on April 26, 27 and 28. Secretary Meserve promises an interesting program.

The Peerless Silk Dyeing Company, Philadelphia, Pa., has been reorganized and the entire legal capital stock has passed into new hands. W. S. Bradway is president, Henry Farquhar treasurer and Willis Farquhar secretary. The new concern will continue operating under the old name.

The Akra Sales Corporation, New York City, dyes and affiliated products, has been incorporated with a capital of \$6,000. The incorporators are E. Grube, R. H. Korn and P. Arnaud. The company is represented by A. T. Scharps, Tribune Building, New York.

The Union Ribbon Company and the Alden Silk Company, 48-68 Gray Street, Paterson, N. J., have been consolidated. The new corporation has a capital of \$260,000. The directors are Alexander McDonald, Harry E. Crowter and Ellis Lord, all of Paterson.

The Imperial Cotton Mills, Los Angeles, Cal., now being formed, are to build a cotton mill with a reported equipment of 20,000 spindles. The site of the mill, it is believed, will be in the vicinity of Vernon. An expenditure of \$1,000,000 is involved.

Walter Eyers, superintendent of the Windham Manufacturing Company, South Windham, Me., has severed his connection with that company to accept a position as superintendent with the Wilton Woolen Company, Wilton, Me.

A new idea and a very practical achievement has been attained by Cheney Bros. in a new panne velvet ribbon. It is called "Veltyn," and is for millinery purposes as well as for dress trimmings. In a most ingenious way the new panne has been worked out so that the objectionable features of the ordinary pan velvet ribbon are overcome. Veltyn may be rubbed up or down without disturbing the nap, which remains perfectly smooth when so handled. This ribbon is wound on spools instead of on the usual long reel, and it is obtainable in various widths and in all colors.

The Trenton Hosiery Mills, Broad Street Bank Building, Trenton, N. J., has been incorporated, under the laws of New Jersey, to knit, manufacture, finish, buy and sell hosiery of all kinds; to buy and sell dyestuffs and related chemicals and oils; to buy, sell and spin cotton and mercerized yarns of all kinds; to buy, sell, throw and wind silk and silk threads; to buy, sell, throw and wind artificial silk and fiber threads; to manufacture, buy and sell products and things used.

The Penn-Victor Hosiery Mills, Reading, Pa., has been organized for the manufacture of women's hosiery. Irvin Binkley & Son are the proprietors. The equipment comprises five 220-needle latch needle machines, one looper and one welter. The company buys 26s single cotton yarn.

It is announced that operations will be resumed immediately by the H. C. Frick Coke Company, Pittsburgh, Pa., at three of the coke-making plants in the northern end of the region. These plans have been idle more than a year. Other ovens have been ordered fired at plants now in operation, principally in the south end of the region. These operations mean the employment of about 1,200 men. One of the plants to be put in commission employs 500 men.

Pima Textile Industries, Phoenix, Ariz., is preparing plans for building a cotton mill with equipment of 1,000 looms. While it is not stated where the mill will be located, it is understood that a site on the Pacific Coast will be chosen. The capitalization of the company is \$4,000,000. Shane Morgan is president and Edward C. Bradford is treasurer.

The acquisition by Crosses & Winkworth, cotton spinners, of the mills of William Heaton & Son, of Bolton, Lancashire, containing 263,000 spindles, brings the total spindleage of Crosses & Winkworth up to about 1,500,000, and will, it is said, make that company the largest spin-

ning concern in the world. The firm of Crosses & Winkworth Consolidated Mills, Ltd., was registered in March, 1920, and at that time was said to own thirteen mills.

The Star Hosiery Mill, of Spartanburg, S. C., has been purchased by the A. B. Victorious Company, New York, which operates a chain of hosiery mills in the South. The mill continues operation under its present name. The manager is J. C. Lloyd, formerly secretary of the company.

The "Knit Goods Bulletin," organ of the National Association of Hosiery and Underwear Manufacturers, has suspended publication. The magazine was launched in 1908 as a medium for the exchange of information among the members of the association. With the passing of the "Bulletin" a special News Letter will be issued each week, which, it is thought, will serve the members of the association to better advantage.

The Beverly Chemical Company, Boston, Mass., has been incorporated with a capital of \$25,000. William J. Sullivan, 12 Stoughton Street, Medford, Mass., is president and treasurer.

Manager Chester I. Campbell, 5 Park Square, Boston, Mass., is sending out space diagrams for the Eighteenth Annual Knitting Arts Exhibition to be held in the Commercial Museum, Philadelphia, Pa., under the auspices of the National Association of Hosiery and Underwear Manufacturers, during the week of May 22. The price for space is \$1.25 a square foot, including all necessary booth equipment. The first official allotment of space will be made about January 20 in Philadelphia. S. D. Bausher, president of the Association, is chairman of the special exhibit committee. H. S. Horrocks, of the H. Brinton Company, Philadelphia; F. A. Rakestraw, of the Hyde-Rakestraw Company, Philadelphia, and J. N. McCullaugh, consulting industrial manager of the Association, are members of the committee.

Announcement has been made by Louis Friedman, 2229 Creston Avenue, New York, formerly of the Friedman Dyeing Company, 386 Second Avenue, New York, specializing on the dyeing of artificial silk and bisca straw cloth, to the effect that he has severed his connection with that concern, of which he was president and organizer, and is now at liberty. He is a graduate of the Philadelphia Textile School, from which institution he went to the dyestuff testing laboratory of Marden, Orth & Hastings Company. He was a Government textile tester for two years, and during the war served in the Quartermaster Corps in charge of the laboratory at Schuylkill Arsenal. Later he formed a connection with Walter F. Sykes & Co., and was for two and one-half years in the dyestuff testing laboratory of that concern, which he left to organize the Friedman concern.

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

J. N. B.—*Question:* Is there any advantage in chroming a sulphur black on cotton, or is it a useless expense?

*Answer:* Sulphur blacks are not greatly improved in shade by chroming, and they generally become a few shades redder; but their fastness is greatly increased and, what is even more important, there is then no danger of the goods becoming tender in storage or after cross-dyeing, scrooping or any operation in which acids are used. Consult Whittaker's book on dyeing for a full account of the dyeing of sulphur colors, and note how necessary it is to destroy, by oxidation, the loosely combined sulphur which changes to sulphuric acid and tenders the cotton. As most of the objections to sulphur colors are based on the tendering of the goods, we believe that after-chroming should always be done to avoid further trouble.

W. H. D.—*Question:* What is the proper dyestuff to use in coloring iron gallate ink, and how can it be best tested for this purpose?

*Answer:* In pre-war times the dye used was Rein Blue 6B, sometimes called "Rhine" Blue. This was the extreme green shade of Cotton Blue, an alkali salt of the trisulphonic acid of aniline blue base. Ordinary Alkali Blue is the monosulphonic acid, Soluble Blue the disulphonic acid and Cotton Blue the trisulphonic acid. The commercial dyes are the sodium salts and are soluble in water, but the addition of acid separates the color acid.

In testing, make a solution of 1 to 100 of the dye in water and add an excess of sulphuric acid and allow to stand for half an hour. Alkali Blue, under these conditions, when spotted on filter paper will show a heavy precipitate with a ring of clear water. Soluble Blue will show some precipitate and a tinted ring, but the proper dye for ink will show no precipitate, only a strong blue color to the edge of the spot.

R. H.—*Question:* Which class of dyes is most suitable for coloring gelatine, and which is the fastest?



*Answer:* Gelatine sheets for spotlights and theatrical purposes are colored with both basic and acid dyes. We have no data regarding fastness, but have heard from manufacturers that certain dyes like Fuchsine stand light a long time, while Methylene Blue, which is faster as a cotton dye, fades rapidly. Evidently you will have to determine the relative fastness by tests on your own material, because it is not a rule that a color that is fast on wool or cotton will be fast when on a gelatine film. If your work is in connection with motion pictures, the situation is still different on account of the chemical union of the dye with the silver salts forming the picture and the short duration of each exposure to the light.

C. S. R.—*Question:* What is the safest way to strip acid dyestuffs from wool without injuring the fiber in the slightest degree?

*Answer:* Acid dyes on wool will generally strip slightly if put in a fresh bath with about 25 per cent of Glauber's salt at a boil. The action of the Glauber's salt is to lessen the hydrolysis of the acid and at the same time its effect on the color. Sometimes, however, there is so much acid combined with the color and the wool that the dye refuses to come off. In such a case you may add soda ash in small portions till the acid is neutralized, then the dye will begin to bleed into the bath without there being present any alkali to harm the wool. A slight excess of alkali is not harmful, providing it is washed out later; but it should never be allowed to dry in the wool.

In every case stripping should be commenced in this manner and all the color removed that is possible in this way. When all the color is to be stripped, the soda strip should be followed by stripping with zinc sulphoxalate-formaldehyde (pre-war name: "Decroline") and acetic acid. This requires at least 20 per cent of acetic acid and a boiling for twenty minutes or longer. After stripping, wash well and neutralize with soda at 120 deg. Fahr. Delicate fabrics have been treated by this process without harm, but, as with all such methods, the important point is to wash out all traces before redveing.

## Review of Recent Literature

*The Fundamentals of Color Research for Textiles.* Hibbard S. Busby. "Textile World," February 4, 1922, p. 146.

In discussing the various types of standardization in use, the author maintains that no one "color theory" or method of analysis should be accepted as "the method of all outdoors" and a general solution of color difficulties. Each method, each system, offers advantages in certain problems, and the function of the investigator is to apply

the particular one of these methods which best fits the need. Many isolated researches in color, optics and general physics have been demonstrated, recently, to have a bearing on such problems; only the research worker with the broadest viewpoint and the widest range of experience in varied lines may visualize the problem in such a manner as to offer the proper solution.

Certain types of standardization call merely for a means of matching which is repeatable. Frequently, however, it becomes necessary to study the hue or other relation that exists between two or more color effects from a viewpoint that will make it possible to interpret the analyses in terms of the laws which govern optical and color relations. Another means of analysis of great value is that in which the record is expressed in terms of the mixture of variable quantities of reflected color and interpreted through geometrically arranged diagrams; while another—most annoying—problem to be met is the specification and registration of colors that are "nearly white" and those that are "nearly black."

Three factors of specification of a color are recognized by scientists to-day, and the author provides a chart showing in chronological order the terminology applied to the following definitions: The quality which distinguishes the difference between such sensations as blue, green, red, etc.; degree of purity or degradation of a color as it is clarified or dulled by the addition or subtraction of gray, and the gradation of a color from light to dark. He contends, however, that to the man in the application laboratory who must interpret such effects as texture, sheen, etc., these are insufficient, and a study of purely non-chromatic properties has been necessary in order to supply the material essential to repeating these auxiliary-to-color effects in a medium other than that native to them. The motive for laying stress upon a factor of research which may appear, at first glance, to include only a very limited field of effort, is found, author holds, in the fact that within the past five years the departure of process research from the purely chemical to include the study of minute physical phenomena has brought about an unprecedented advance of the arts.

No association of persons who use color in their industries, nor any particular isolated one of them, can obtain any benefit from the vast range of applications offered by the science without a rigid preliminary survey based upon: The economics and finance of the problem, the necessary technical skill and color knowledge, a clear agreement between client and adviser as to the ends desired and the allowable methods of approaching them, and, finally, the drafting of a definite program and the delegating of sufficient authority for its successful culmination.

*British Patent 169,167.* Alpha-Aminoanthraquinone, issued to the Society of Chemical Industry in Basle, Basle, Switzerland.

In this is described a process for preparing alpha-aminoanthraquinone by heating alpha-anthraquinonesul-

phonic acid with ammonia, in the presence of a sulphonic acid of an aromatic nitro compound. One method of procedure is as follows: 165 parts potassium alpha-anthraquinonesulphonate, 500 parts of ammonia solution, 24 per cent strength, and 60 parts sodium nitrobenzenesulphonate are heated together to 160–165 deg. Cent. in an autoclave for twelve hours. After cooling, the contents of the autoclave are filtered and the alpha-aminoanthraquinone formed washed with boiling water. The yield will be about 80 per cent. Aniline sulphonic acid can be recovered from the filtrate.

*A Systematic Qualitative Chemical Analysis.* George W. Sears, Ph.D., Associate Professor of Chemistry, University of Nevada. Cloth; VI plus 119 pages; 6 x 9; four figures; \$1.75. New York, John Wiley & Sons.

This work is a textbook providing a complete scheme of qualitative analysis, containing an entirely new and systematic method for acids. This is based on the same principles of separation and detection as are commonly used in metal analysis, and has proved successful, author declares, in the hands of the students at the University of Nevada for the past two years. The general arrangement of the text matter is the outgrowth of more than ten years' experience with beginning students, and not only trains the student in the methods of analytical chemistry but also in the principles underlying chemical reactions from the standpoint of mass action. With a few necessary exceptions, only qualitative methods are used.

The contents embrace: Part I. Introduction. Laboratory Suggestions. Part II. The Systematic Analysis (Cations). Preparation of Solution. Discussion. Questions for Review. Part III. Acids (General Statement). The Systematic Analysis (Anions). Preparation of Solution. Discussion. Questions for Review. Appendix I. Preparation of Reagents. Appendix II. Preparation of Test Solutions. Appendix III. Table of Solubilities. Appendix IV. Table of Atomic Weights.

*Dress, Blouse and Costume Cloths.* Roberts Beaumont and W. G. Hill. London, Sir Isaac Pitman & Sons.

In the production of dress, blouse and costume cloths, cotton, woolen, worsted, linen, silk and artificial silk are all employed, singly and in combination, and all known weave structures utilized; consequently an extremely wide knowledge of weave construction and the properties of the principal textile fibers is required. The authors have treated the subject at length, covering 570 pages and including more than 700 illustrations, the work being divided into ten chapters. Industrial and commercial aspects of dress-goods designing and production are treated, and there is a separate chapter devoted to thrown, spun and artificial silk. The yarn unit as a controlling factor in fabric design and textural quality is treated at length. Weave elements as they affect cloth construction are dealt with, and separate chapters are devoted to drafted patterns, stripes, geometric design bases and weave com-

pounds, spotted and mosaic patterns, practice in figure designing, pile, lappet and gauze structures. The entire work bears the stamp of authority and should be invaluable to anyone engaged in the production of this class of goods.

## Recent Patents

### Treatment of Artificial Goods from Viscose

(1,404,535; January 24, 1922)

MAX LUFT, Boras, Sweden

This relates to the treatment of artificial fabrics, filaments, tissues, films and the like from viscose with water-repellent or water-proofing means, and it consists in the manner in which the materials are treated.

It is well known in the manufacture of artificial fabrics, as artificial silk, films, plates and the like, from viscose (solutions of cellulose-xanthate) to separate the sulphur and its compounds accumulating in the said goods during the decomposition of the xanthates by treating them with solutions of sulphides of alkali.

The artificial goods are treated with solutions of soap or with water-proofing means while the process of separating the sulphur and its compounds from the said goods is going on. It has been found that during this process the viscose is very capable of absorbing soaps and water-proofing ingredients. The sulphur leaving the interior of the capillary filaments causes the instant formation of pores in the filaments and renders their walls permeable so that the soap and the impregnating means are uniformly incorporated into the artificial goods without weakening them.

By this combination of the simultaneous separation of the sulphur from the fabric or the thread and the incorporation on its place into the hollow structure of the viscose-products of the finishing ingredients, as soaps, solutions of gum or any other water-repellent or water-proofing means, the operator is said to attain a considerable advantage as against the known methods for softening or impregnating of fabrics which might likewise be used for viscose.

The treatment is carried out in a single-bath process. The soap may be added in an alkaline solution to the solution of sodium sulphide. Or if the fabrics are at the same time to be impregnated, the metallic salts, the solution of gum, resin or salts of resin (metallic resins) are solved or emulgated with an addition of a small quantity of alkali and this solution or emulgation is added to the desulphurizing bath before the fabrics are brought into it. The bath is kept during the treatment, which lasts one-half to one hour, on a temperature of 40 to 50 deg. Cent. Repleted with an addition of fresh sodium sulphide, soap or of the impregnating means, the bath may be repeatedly used. The treated goods are freed from the excess of the bath, acidified, washed in plain water



or in a solution of soap, centrifuged or squeezed and dried at a temperature of 40 to 50 deg. Cent. The concentration of the desulphurizing bath, of the solution of soap and the impregnation means depends in a wide range upon the goods to be treated and upon the degree of the required properties as to the softness, the luster and the elasticity.

Examples of the treatment bath are as follows:

1. A watery solution is prepared containing 3 per cent sodium sulphide, 2 per cent soap,  $\frac{1}{2}$  per cent caustic soda. The finished raw silk in skeins is treated in this bath for about one-half to one hour at a temperature of 50 deg. Cent.

2. The bath contains 3 per cent sodium sulphide, 2 per cent soap, 2 per cent caustic soda, 5 per cent aluminum acetate.

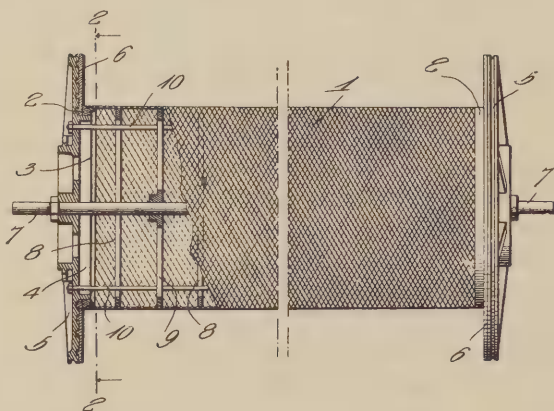
The treatment of the silk is the same as in the first example.

### Warp Dyeing Beam

(1,404,634; January 24, 1922)

FRANK M. MORTON, Phoenix, Ala.

This invention relates to an improved warp dyeing beam and one object of the invention is to provide a beam having a cylinder of woven fabric provided with packing rings at the ends of the cylinder which are formed of lead or other non-corrosive metal and have the end portions of the fabric cylinder embedded therein, the pack-



ing rings fitting upon inwardly extending annular flanges carried by the heads of the beam. By providing the cylinder with packing rings at the ends of the cylinder and having these rings fitting upon annular flanges of the heads, a head may be easily removed and a new one put in place in case it should become broken, and, further, the beam can be easily and quickly taken apart and put together when necessary.

The illustration is a view showing a dyeing beam partially in elevation and partially in section, and showing the cylinder of the beam provided with the improved packing rings at its ends.

This improved beam is provided with a cylinder 1 which is formed of woven wire fabric and having at its

ends packing rings 2, which are formed of lead or other non-corrosive metal, and have the end portions of the wire fabric cylinder 1 embedded therein.

The rings 2 are thickened inwardly of the cylinder and in the form are cut away from their inner ends as shown at 3, so that the peripheral faces of these rings which fit upon the inwardly extending flanges or collars 4 of the heads 5 will be of the proper width to extend from the end of a flange 4 to the lead facing 6 of the head. When the beam is assembled, the shaft 7 extends longitudinally through the cylinder and the cylinder is supported and braced by means of the rings 8 and supported by the plates 9. The heads 5 which fit upon the shaft 7 are positioned at the ends of the cylinder, and when the nuts of the securing rods 10 are tightened, the packing rings 2 will be properly seated upon the inwardly extending collars or flanges 4 and have close contact with the lead facings 6 of the heads. If one of the heads should be broken, it can be easily removed and a new one put in place; or if it is desired to take the beam apart for cleaning or repair purposes, this can be easily and quickly done. It will thus be seen that by means of these packing rings 2 there has been provided a dyeing beam in which broken heads can be easily removed and new ones put in place and in which the beam can be easily and quickly taken apart and put together again. It should be further noted that these packing rings serve to reinforce the end portions of the cylinder and permit of easy assemblage, and also serve to form tight joints between the heads and cylinder so that the dye liquid cannot pass between the body of the beam and the two heads or disks, and will therefore be forced to pass through the perforated body and then through the yarn wrapped upon the beam. If the dye liquor is permitted to pass between the heads and the body of the beam, the yarn at the ends of the body will be dyed a deeper color than the rest of the yarn, and this will cause the yarn to be streaked with relatively light and dark portions when unwound.

### Method and Device for Bleaching Textile Fibers and Fabrics, Tissues, and the Like

(1,404,467; January 24, 1922)

ROBERT MOHR, Eibergen, Netherlands (assignor of one-half to Naamlooze Vennootschap de Eibergsche Stoombleekerij, Voorheen G. T. Ten Cate en Zonen, Eibergen)

This invention relates to a process and apparatus for bleaching textile products, textile fibers and the like, without boiling and by means of chlorine or oxygen, whereby loss of chlorine and oxygen is prevented as much as possible, and the gas that is liberated from the bleaching liquor is collected and returned to the latter to be absorbed therein. As is well known, chlorine or active oxygen is liberated very quickly at high temperatures and these gases are then regarded as lost in the process hitherto in use. The designed apparatus aims to prevent such losses.

The process consists in first charging the bleaching vessel with goods to be bleached and with the bleaching liquid. The vessel is then closed and a pressure of 2-3 atm. is developed and maintained. The bleaching liquid is kept in circulation, passing not only through the bleaching vessel but also through an expansion vessel and a filtering or saturating tank, or both.

Care should be taken that the air is pumped out of the expansion vessel until a continuous vacuum is obtained. The bleaching gases developed in this vessel are returned into the saturating tank, while the liquid in this vessel passes a filtering material so as to remove the suspended particles.

Devices wherein other reservoirs are connected with the vessel are known. These, however, differ materially in construction and function from the device of the invention, inasmuch as this latter is intended to prevent the presence of air in the vessel to keep up the strength of the bleaching liquids and to effect continuous cleansing.

The chlorine or oxygen which is set free is, according to this invention, sucked by a compressor again and the bath is saturated anew in a saturating vessel. Accordingly, only the quantity of a bleaching agent required for the goods is used. Therefore there are no losses, the process is more economical and the bleaching action of the liquid lasts longer. As the process is carried out under pressure, the bleaching power of the active oxygen is much greater and accordingly the bleaching action is remarkably strong.

The device to be specified below in connection with the process is such as to make possible the treatment of the raw materials and products of the textile fabrication with different baths. Either chlorine, acid or oxygen may be used, and finally an after-treatment with soap.

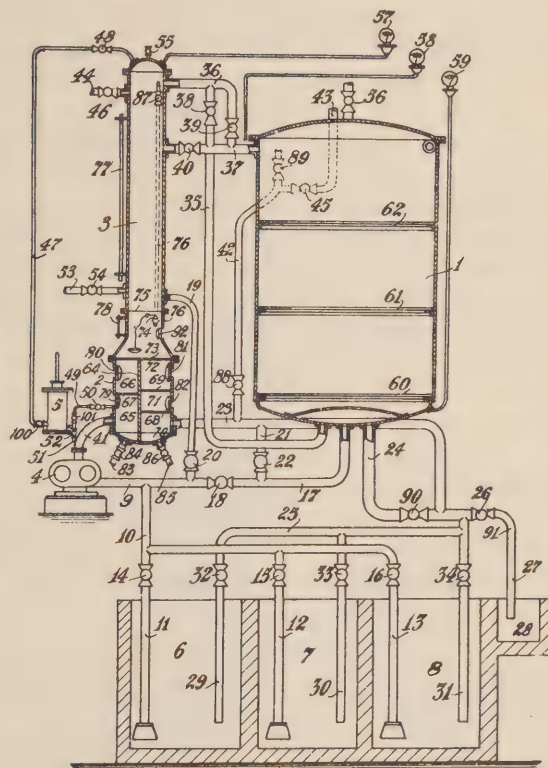
In the process, according to the invention, the bath can be used as economically as possible, and in case of cotton efficient bleaching without boiling is effected. The working temperature need not exceed 80 deg. Cent. Linen yarn needs only one single previous boiling with 2 per cent chlorine and passes out of the device nearly bleached, while in the process hitherto in use three or four boilings were required. The treatment in the device is exceedingly delicate, and gives little chance to damage, so that it is possible to bleach also fine materials, in particular curtains, lace and like materials.

The illustration shows the device schematically, partly in side view.

The device consists of a bleaching vessel 1, a saturating and filtering vessel 2, an expansion tank 3, a circulating pump 4, an air pump or compressor 5, the vessels 6, 7 and 8 for the liquid, and pipes connecting these parts and provided with cocks for controlling the direction of the bath liquid.

Connected with the suction pipe 9 of the pump 4 by means of a pipe 10 are the suction pipes 11, 12 and 13 of the bath liquid reservoirs 6, 7 and 8, which suction pipes are provided with cocks 14, 15 and 16; the pipe 9 is also connected to the bleaching vessel 1 at the bottom of a pipe 17 having a cock 18, and to the expansion vessel 3

below by a pipe 19 having a cock 20, and also to the filtering vessel 2 by a communication pipe 21, with cock 22 issuing from the part 17. A connection pipe 23 ends in an outlet pipe 24, which issues from the bottom of the bleaching vessel 1. To the pipe 24 are connected the common return pipe 25 to the liquid reservoirs 6, 7 and 8, and the outlet pipe 27 provided with a cock 26 to the outlet channel 28. Three return pipes 29, 30 and 31 of the liquid reservoirs 6, 7 and 8 are connected with the



return pipe 25 and are provided with cocks 32, 33 and 34. The bleaching vessel at the bottom is connected by a vertical pipe 35 with pipe 36, which runs from the top of the expansion tank 3 to a tube 37 immediately connecting the bleaching vessel with the expansion tank. The pipe 35 is provided with cock 28 before the connecting point with tube 36, and the latter tube is in the same way provided with a cock 39 before the connecting point with tube 37. The connecting tube 37 is provided with a cock 40 between expansion tank 3 and the connection with tube 36. Pump 4 is connected with the filtering and saturating vessel 2 by a delivery pipe 41; the pipe 23 issuing from the saturating vessel is connected with pipe 42, which is connected with the upper part of the bleaching vessel. The latter and expansion vessel 3 have water-supply pipes 43 and 44 provided with cocks 45 and 46, respectively. The compressor 5 is connected on the one hand by a pipe 47 provided with cocks 48 and 100 with the top of the expansion vessel 3, and on the other hand by a tube 49 provided with cocks 50 and 101, with the lower parts of the filtering and saturating vessel 2. A pipe 51 with cock 52 branches from tube 49, before the cock 101.

The expansion vessel 3 has below a steam supply pipe



53 provided with cock 54. Expansion vessel 3 and bleaching vessel 1 are provided at the top with air cocks 55 and 56, respectively.

The manometers 57, 58 and 59 are connected, respectively, with the upper part of the expansion vessel 3, with the connection tube 37 between the latter and the bleaching vessel 1, and with the lower part of the bleaching vessel.

The bleaching vessel is divided into a plurality of sections—e. g., three, according to the quality of the goods to be bleached and the size of the vessel—by means of removable perforated bottoms 60, 61 and 62. These bottoms consist of three parts, with a view to the ready removal and returning, and are constructed as liquid distributors. Such a bottom consists of a grating of bars, lens-shaped in section, arranged at a distance of about 2 mm. apart, for carrying the goods under treatment.

These liquid distributors completely prevent the passage of the goods, and as the liquid is checked against the grating it distributes itself and sprinkles the goods below. Furthermore, the packing of the goods is prevented, because the goods are carried by the grating. Where the pipes 17, 24 and 35 discharge into the bottom of the bleaching vessel their ends are covered with a curved sieve. The upper part of the filtering or saturating vessel 2 is narrower than the lower part. The lower part is divided into two compartments by vertical partition 64, one of which compartments is connected with the pumps 4 and 5 and is divided into two subdivisions 65 and 66, which are separated by a sieve 67, while the other compartment is divided into three subdivisions 70, 71 and 72 by means of two sieves 68 and 69. The upper subdivisions 66 and 72 are separated by a sieve 73 from the uppermost narrow space of the filtering and saturating vessel. At this place a float valve 74 is provided below the bottom 75, separating the two vessels 2 and 3. The float valve 74 cuts off a connecting pipe 76 opening into the upper end of vessel 2 and discharging at the other end below the cover of the expansion vessel 3. This pipe is provided with a cock 87. The expansion vessel 3 is provided with a gauge glass 77, and in the same way the upper part of the vessel 3 is provided with a gauge glass 77. The subdivision 72 of vessel 2 is charged with coarse excelsior and the subdivision 71 with fine excelsior. The subdivisions 65, 66, 71 and 82 have manholes 79, 80, 81 and 82 for cleansing purposes. The float valve in the upper part of the filtering and saturating vessel may be examined by means of a manhole 92; moreover, both compartments or divisions are provided at the bottom with discharging tubes 83 and 85, having cocks 84 and 86, respectively. Finally pipe 42 has another cock 88 in the lower part and the cock 89 in the upper part between the place of discharge into the bleaching vessel and the connection with the water conduits.

With this device all kinds of fabrics woven from vegetable fibers, light or heavy, can be bleached completely after previous maceration and more efficiently than hitherto by either sodium hydroxide or lime bleaching. The formation of oxycellulose and stains, damages and defor-

mation of the material by rough treatment are excluded, besides the bleaching is cheaper than with any known bleaching process. A different treatment can be executed subsequently without removing the goods from the apparatus. In this way the goods are saved, besides the required labor being less. The saving of the goods is chiefly effected by making boiling superfluous.

### Process of Bleaching Material

(1,404,242; January 24, 1922)

HARRY B. SMITH, Albany, N. Y.

The kind of material to which this process is primarily adapted is unbleached cotton goods containing motes, shives and (or) leaf. The process is applicable, however, to any material containing vegetable or animal fiber, such as any class of cotton goods or yarns, wool, silk, fiber silk or mixtures of same.

One of the objects of this invention is to provide an improved process of bleaching such material which is simple, efficient and requires only a relatively short time.

Inventor employs an alkaline oxidizing agent which is preferably composed of about half each of peroxide of sodium and a salt of an alkali metal, such as sodium chloride, soda ash, silicate of soda, caustic soda, phosphate of soda, alone, or a mixture of any of these salts. The combined weight of the peroxide of sodium and salt of an alkali metal is preferably about 7 per cent of the weight of the cotton material under treatment. A solution of these chemicals is strongly alkaline and at the same time oxidizing. Because it is strongly alkaline the time required for removing the motes, shives and (or) leaf is relatively short. At the same time the alkalinity is not sufficiently intense to harden the material to be bleached. This solution has been found to operate with entire satisfaction, but it is understood that any oxygen liberating product, but preferably those corresponding to the "per" salts and preferably for a purpose hereinbefore stated, along with the salt of an alkali metal, will give satisfactory results. For instance, peroxide of hydrogen, percarbonate of sodium, persulphate of sodium or persilicate of sodium may be used with a suitable salt of an alkali metal or a mixture of salts such as those mentioned above. Inventor has, however, obtained the best results with peroxide of sodium.

The dyes preferably used for bluing are alkali blues, inasmuch as they are substantially operatively unaffected by the oxygen yielding compounds and alkalies which are used in the process. Inventor has, for example, employed in practice as a suitable dye that having the trade name "Alkali Blue RS." These dyes and their chemical composition are well known in the art. They are acid dyes; that is, they require an acid to render them effective. Such dyes cause a very brilliant whiteness in the bleached material. While various acids might be used for this purpose, inventor prefers an organic acid, such as acetic acid. Such an acid does not attack the fiber of the cotton and gives very satisfactory results in bluing. Furthermore, by its reaction with the sodium peroxide or its

equivalent it liberates oxygen while the bath is at a high temperature, which greatly assists the bleaching operation. At the same time it destroys the organic coloring matter in the cotton, thereby increasing the whiteness of the material.

The goods are first washed with boiling water, as is usual in the art, to remove greasy or waxy foreign matter from the fibers. The cotton material is then passed into a bath at normal atmospheric temperature containing the alkali blue. About 50 grains of the dye may be used to 100 pounds of the cotton material. This bath is allowed to work on the material for about fifteen minutes. The acetic acid is then added to the same bath to develop the color. The acetic acid may be in amount about 2 per cent of the weight of the cotton material. After the acetic acid has been added, the bath is allowed to act upon the material about ten minutes longer, after which the bath is brought to a high temperature, preferably between 170 and 180 deg. Fahr. It is unnecessary to bring the bath to a boil and preferable not to do so. Sodium peroxide and sodium chloride or other alkali metal salt, in the amounts previously mentioned, are now added and the bath maintained hot, preferably between 170 and 180 deg. Fahr., for a considerable period of time. An hour and a half is ample for this last step. It is the function of the sodium chloride or other alkali metal salt to aid in the development and fixation of the coloring matter on the fiber, as well understood in the art.

During the process the motes, shives and (or) leaf are subjected to a chemical action which probably softens and dissolves them.

### Machine for Making Tulle

(1,404,373; January 24, 1922)

EMANUEL CAVICELLI, St. Margarethen, near Munchwilen, Switzerland (assignor to the Firm Schweiz, Gesellschaft fur Tullindustrie A.-G., Munchwilen)

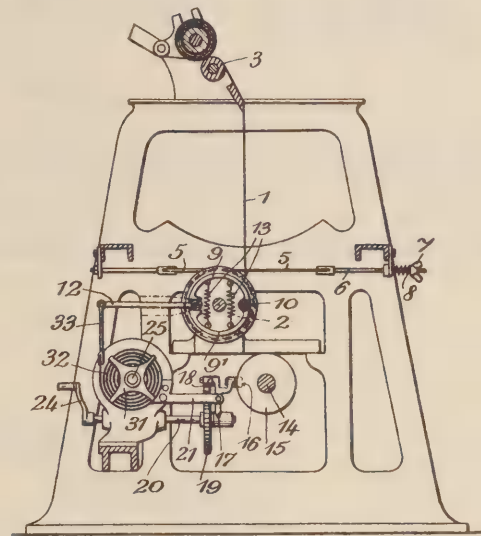
This invention relates to machines for making tulle or bobbinet and more particularly to a combination warp beam brake for such machines.

The tension of the warp threads in tulle machines is preferably produced by braking the warp beam. As is known, the tension of the weft threads—that is to say, of the diagonal spool threads—continuously increases during the working process, and the tension of the warp threads must be increased to a corresponding extent in order to avoid any deformation of the hexagonal mesh or loop structure. To that end, the band or rope brake with which the existing constructions of tulle machines are provided are in most cases more strongly applied by the hand of the tulle weaver during the working process. Constructions are also already known in which the increase of the braking action of such a brake is automatically produced in dependence on the rotary motion of the warp beam. This brake construction cannot, however, be applied with a satisfactory effect to modern heavy tulle machines, as in the case of unavoidable higher brake pressures in heavy tulle machines the brake devices not only lose their sensitiveness but fail alto-

gether. The faces of the brake disk become corroded or damaged when steel cables are used. If hemp ropes are used, the braking is affected by the influences of the different heat and moisture conditions. In both cases the action is exceedingly injurious to the nature of the fabric produced.

This invention relates to a brake device for the warp beam, in which the above mentioned drawbacks are avoided.

According to this invention, a combination brake is provided which comprises a braking means by which the



normal tension of the warp threads is produced at the beginning of the working and maintained constant during the whole working period, and additional braking means which produce an additional braking action increasing during the working process and derived from the rotary motion of the machine.

The illustration shows a side elevation of a tulle-making machine provided with the device.

In this drawing, 1 indicates the warp threads which are unwound from a warp beam 2, then woven into a fabric by the two wefts, and wound over a suitable breast beam 3 and pressure roller onto a cloth beam in the form of a finished fabric. To the warp beam 2 is firmly secured a brake pulley 4, the rim of which is provided with flanges between which is mounted a brake band 5, one end of which is secured to the machine frame, while the other end is secured to a pull rod 6. The rod 6 is provided with a screw thread and can be pulled by hand by means of a thumb nut 7, which through the intermediary of a spring 8 presses against a support provided on the frame. In that way a braking action can be exercised on the brake pulley 4, and therefore on the warp beam 2. On the inner circumference of the rim of the brake pulley are provided two brake jaws 9 and 9' which are rotatably mounted on a pin 10 secured to the machine frame and can be pressed against the rim of the pulley by means of a cam 11 arranged diametrically opposite the pivot pin 10 and rotatably mounted on a pin secured to the frame.



The cam 11 is turned by means of the brake lever 12 and presses the two brake jaws apart and against the inner face of the pulley rim. Two springs 13 bring about the withdrawal of the brake jaws from the brake pulley and their return to the initial position, when the lever 12 is brought back to its original position at the beginning of the working process. The gradual tightening of the brake lever is brought about by the rotation of a driving shaft 14 in the following manner:

To the shaft 14 is secured a pulley 15 provided with a cam face, which at each revolution acts on a roller 16. The roller 16 is secured in a cranked lever 17 which carries on the other arm a pawl 18 engaging with a ratchet wheel 19.

The ratchet wheel 19 is secured on a spindle 20 on which the lever 17 is mounted so that it can swing on it. The roller 16 is pressed against the pulley 15 by a spring (not shown in the figure) secured to a fixed arm 21, and at each revolution of the shaft 14, owing to the rolling over the cam face, experiences a movement in a plane at right angles to the spindle 20. Owing to this operation the lever 17 swings about the spindle 20 as its axis of rotation, and the pawl 18 turns the ratchet wheel 19 and the spindle secured to it, to the extent of at least one division. On the spindle 20, which is mounted in the casing of a worm gear 22, 23, is mounted a worm 22 which is in engagement with a worm wheel 23, and, further, at one end of the spindle there is also provided a crank handle 24 for operating the spindle by hand. The worm wheel is mounted loose on the worm wheel spindle 25 and has on one side of the worm a number (eight in the drawing) of interchangeable bolts 25<sup>1</sup> concentrically screwed in. On the worm wheel spindle 25 is keyed on one side of the worm wheel a ratchet wheel 26, which is driven by a pawl 27. The pawl 27 is mounted on a double-armed lever 28 mounted on a pivot pin on the worm gear casing. The rotation of the spindle 20 is transmitted by the worm 22 to the worm wheel 23. The oscillating movement of the lever is produced by the action of the bolts 25<sup>1</sup> on a cam 29 secured to the lever 28, owing to which the ratchet wheel is turned by the pawl to the extent of at least one tooth at each passage of one of the bolts 25<sup>1</sup> past the cam 29. By a spring 28<sup>1</sup> secured to the other arm of the lever 28, the latter is pulled back against a stop 28<sup>2</sup>. Another pawl 30, rotatably mounted on the casing, is in engagement with the ratchet wheel 26 for the purpose of preventing the wheel from turning back. At the other end of the worm gear spindle 25 is secured a winch-like spider 31, between the arms of which is mounted a spirally coiled spring blade 32. The inner end of the spring blade or coil is secured to the hub of the spider, the outer end to a traction part 33 which connects the brake lever 12 to the spring 32. The rotation of the ratchet wheel 26 produces therefore a winding of the spring blade 32, owing to which a gradually increasing pull is produced on the brake lever arm, and therefore a constantly increasing braking action.

By changing the number of the bolts provided in the disk of the worm wheel, the gear ratio between the num-

ber of revolutions of the driving shaft and the number of revolutions of the spring blade spindle can be altered, and thus a modification obtained in the increase of the tension of the warp threads. Another method of regulating the gear ratio consists in the adjustment or shifting of the stops of the levers which carry the pawls. In that way it is possible to move the pawls back by the springs on the lever to such an extent that instead of engaging with the next tooth, they engage with the second, third, and so on, of the ratchet wheel, and during the next oscillation of the lever would turn the ratchet wheel to the extent of more than one tooth.

The combination of the brake lever with the spring blade has the great advantage of a braking action taking place in a yielding manner, owing to which the variations of the braking action, due to the friction differences in the sliding surfaces, are automatically equalized or compensated.

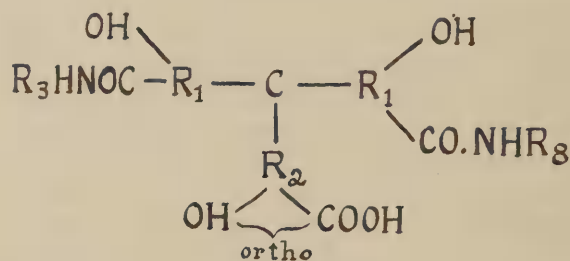
### Dyestuffs Dyeing on Mordant, and Process of Making Same

(1,403,888; January 17, 1922)

MANFRED ALIOTH and ERNST BODMER, Basel, Switzerland (assignors to Durand & Huguenin S. A., Basel)

Inventor describes a process for the manufacture of new red dyestuffs dyeing on mordant, consisting in aryldating an aromatic o-oxycarboxylic acid, reacting with formaldehyde on the aryldio-o-oxycarboxylic acid thus obtained and oxidizing one molecule of the resulting aromatic methylene-diaryldio-o-oxycarboxylic acid, together with one molecule of an aromatic o-ovycarboxylic acid.

Claim is made, as new products, for the red sulphonated dyestuffs corresponding to the formula:



wherein R<sub>1</sub> and R<sub>2</sub> stand each for an aromatic nucleus, which may be substituted, while R<sub>3</sub> stands each for an aromatic nucleus substituted by a sulpho group, the said dyestuffs giving, when dyed on chromed wool and when printed on cotton with chromium mordants, red vivid tints of good fastness.

### Stocking Examiner

(1,402,788; January 10, 1922)

MARGARET K. O'LEARY

Claim is granted, as an article of manufacture, for a device adapted to be inserted in a stocking for the examination thereof comprising a pair of pivoted wings, means to maintain said wings in substantial superposed alignment, and means to force said wings apart in separate parallel planes.

TEXTILES

PAPER

LEATHER

# AMERICAN DYESTUFF REPORTER

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## FEATURES OF THIS ISSUE

In the opening instalment of "The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture," A. K. Johnson discusses future possibilities of its use and describes many of its present applications.

"Piece Dyeing Woolens and Worsteds," by H. J. Fisk, catalogues various causes of trouble in this process, and their remedies.

Proceedings of the A. A. T. C. C. include the fourth Council Meeting, the third Research Committee meeting, a meeting of the Rhode Island Section, and "Color Reactions for Identification of Anthracene Vat Dyes," a contribution by Wallace J. Murray.

Part II of Goldthwait's "Modern Views on Soap."

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the Practical Application of Dyestuffs and the Mechanical Equipment Incidental Thereto

VOL. X.

NEW YORK, FEBRUARY 27, 1922

Number 5

## The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture

### PART I

By A. K. JOHNSON, S.B.

*Lowell Textile School*

Varied Applications—Potentialities—American Industry Slow in Recognition—Direct Part Played Is Physical—Extent of Successful Use Depends Upon Observer—Application in Chemistry—Special Applications—Working Operations—Control of Raw Materials—Control of Processes—Machinery—Finished Materials—Authentic Records

#### 1—THE MICROSCOPE OF PROVED VALUE TO INDUSTRIAL WORKERS

OF all the optical instruments which have proved of great worth to industrial workers in aiding the solution of many types of physical, chemical and biological problems frequently confronting them, the microscope is by far the most important. In some instances the use of the microscope has been indispensable, the information being obtainable in no other way, or, at least, not with the same accuracy. In other cases its use has been to supplement or to substantiate the results of other ways of investigating the same problem, while in a large number of its applications it has been a direct aid in carrying out the usual methods themselves—these being done under the microscope, instead of in outside containers.

The gains from its employment have often been a better understanding of the workings of a process, with subsequent better control; various advances in methods, apparatus and materials, and the selection of remedial treatments for defects or abnormal conditions. In analysis and testing, whether qualitative or quantitative, the rapidity and accuracy gained and economy of labor, expense and materials have proved of great value. Coupled with these gains are the wide diversity of its uses and the mobility of the instrument, which many times permits it to be located at a spot close to the work in question in laboratory, workroom, machine or office. All of these factors have contributed greatly to the value of the microscope as an industrial instrument.

The extent of its worth has been amply proved in those fields where the details of its application have been scientifically studied, recorded in literature, and used until

they have become common property. Most notable among these is that of biological science. Here the vast accumulation of knowledge and methods related to the study of micro-organisms—bacteria, molds, yeasts and fungi—in their beneficial and harmful actions, and of the minute structure of all parts of larger plants and animals, has found successful and wide application. The microscope plays an important and continuous part in all of these uses.

The medical and surgical professions apply them, with far-reaching results, to human beings and domesticated animals, and the horticulturist to cultivated plants, in the prevention, diagnosis, treatment and cure of infectious diseases and other morbid conditions.

Those large industries demanding the presence or the absence of micro-organisms for a part or the whole of a process, place much dependence upon the revelations of the microscope. Among such might be mentioned, first, those industries using fermentation or putrefaction processes, as for the production of alcohols, organic acids (acetic, butyric, lactic, citric), or for the removal of protein or other foreign matter, as in leather tanning, and in flax; second, those making or using medical preparations (vaccines, sera and cultures), and, third, the makers of cheeses and other foodstuffs depending upon the action of bacteria and fungi for ripening processes. In all such types of industries the presence of micro-organisms is desired and regulated. On the other hand, in the canning and preserving of foods and drinks, and in the storage of other perishable goods, the absence of most organisms is demanded.

A more universal industrial application, still requiring biological knowledge, is prevalent. This is in connection



with those industries using non-living, biologic products of plant or animal origin, such as flours, starches or their derivatives, fibers, herbs and natural drugs, spices, food-stuffs, seeds, woods and wood fibers, bone products, and similar materials. With all these it may be desired to identify kinds, origin or previous treatment, and to know quality, purity and condition.

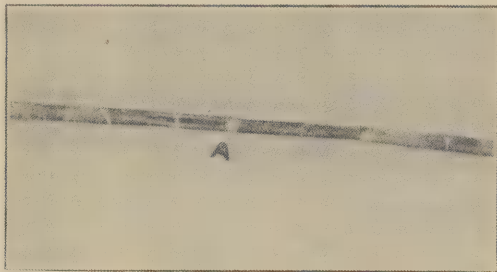


FIG. I—*Linen* ( $\times 100$ )

These biologic uses are so well realized in the general mind as almost to lead to the erroneous conclusion that the microscope is an instrument peculiar to the biological world.

That such is not the case, however, is fully demonstrated in other fields by different types of uses not related to the physics and chemistry of biology but to those of everyday industrial life. Along with the employment of the microscope, in its early history, to the study of animal and plant forms there was developed another application involving the examination of crystalline bodies. From this type of use has been developed the science of "crystallography." Numerous instances of scientific and industrial uses of crystallography are in evidence, as in the identification of substances in chemical analysis, in the study of rocks, minerals and ores, and in metals. The metallurgical world has found the microscope to be of such great value in controlling and improving processes, alloys and in studying results of testing that to-day those industries under scientific control, making or using metals and alloys, depend a great deal upon the rapidity and accuracy of the microscope in their daily working.

A last extensive use of the microscope is as an aid to vision in carrying on working operations of hand or sight, where the object worked with, or the work being

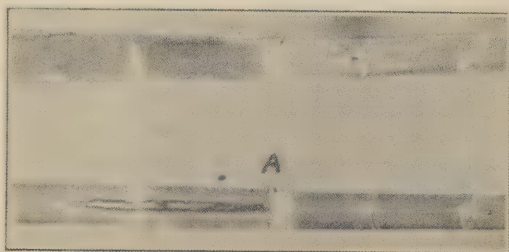


FIG. II—*Linen* ( $\times 250$ ). Compare for Detail and Increased Magnification

done, is visible but indistinct. The use of low powers of magnification, in the forms of "magnifiers," "glasses" or

"lenses," makes possible more rapid, accurate and minute work, with great saving of materials, expense and eye-strain, by engravers, repair men, readers of fine graduations, or by those making nice adjustments of tools and measuring devices, or in studying the structure of yarns, fabrics, papers, etc.

In the cases of biological materials and crystalline bodies, and other applications in textile chemistry where fine working operations are involved, the value of the microscope is beyond adequate expression.

## 2—THE POSSIBILITIES FOR APPLYING THE MICROSCOPE NOT EXHAUSTED WITH THESE ILLUSTRATIONS

While the given illustrations of the successful early employment of the microscope serve to indicate clearly the positive values to be derived from its industrial use, they have by no means been taken advantage of to their fullest possible extent. Furthermore, they by no means exhaust the list of possible and desirable adaptations of

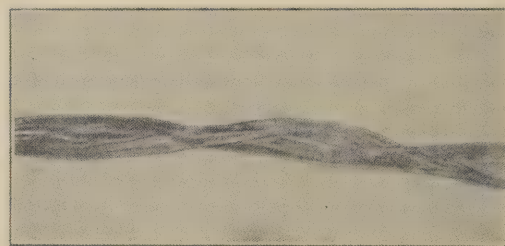


FIG. III—*Cotton, Bleached* ( $\times 250$ )

this "versatile" instrument. The same general kinds of optical physical and chemical properties utilized for microscopic observation in the industries illustrated are present in varied forms in many other industrial connections. They may be used to advantage in the study of problems concerning materials, machinery, processes and finished goods, both in research and in normal control. There is, then, still a wide field to be developed in the industrial use of the microscope.

It is unfortunate, from the viewpoint of microscopists, that the general American industrial world has been relatively slow in actively recognizing the usefulness of the microscope. Some of the reasons for the slow progress are not hard to find. There appears to be, among industrial men, an unfamiliarity with the instrument, its accessories, the simple methods of its use, what it does and what it can be made to do. This is but a natural condition, for small opportunity is offered them to come into personal contact with the instrument in the daily routine of their work. More important still is the fact that the current literature of the average technical man includes but little in regard to this subject.

This condition may also be due to the fact that it is only within recent years that trained chemists and engineers have received instruction in its use. Previously they had had but an inadequate, passing introduction to it in their training, and as a result they have in most cases failed to

grasp an insight into its latent possibilities. Many of those who did receive some school training obtained it from biological sources, so that any future advances into their own field depended a great deal upon their own initiative and efforts. The result has been a general failure to realize the full possibilities of the instrument, not only among regular industrial men but also among its casual users.

The existence of this natural unfamiliarity and inappreciation among industrial workers has not been reduced, or offset, by a persistent, widely disseminated literature from the more successful microscopists. No extended system of educational "propaganda" has been used to attract wide attention to the industrial value of the instrument. Embryonic microscopists and average workers have also been dampened in their ardor by the necessity of developing their own methods, where special methods are needed, and of collecting their own data and descriptions in the new fields of use, through their own applications of principles. This factor, also, has contributed considerably to a delayed increase in the use of the microscope.

Thus, there is great need for continued co-operation and research among industrial users of the microscope to further develop and adapt more special methods where needed, to gather data suited to the industrial use where uncommon information is demanded, and to make these more readily available in forms which will enliven an



FIG. IV—Cotton, Bleached and Mercerized. Compare for Change in Appearance Due to Treatment

appreciation of the instrument among those less acquainted with it.

It is the purpose of this paper to help draw general attention to the proved usefulness of the microscope when applied to the many forms of industrial problems within its province, and to help stimulate an increased interest which shall lead more workers to investigate the literature of microscopy,<sup>1</sup> study the principles employed and apply these to the extension of their own use of this valuable instrument.

<sup>1</sup> See Decennial Index to Chemical Abstracts, etc.

### 3—THE DIRECT PART PLAYED BY THE MICROSCOPE IS PHYSICAL

Before discussing with detail some of the possible applications of the microscope, it is desirable to call to mind, in general terms, just what the instrument does in



FIG. V—Cotton Cloth, Bleached, Showing Dust Particles and Twist

performing its part. The microscope does no more than give a visual, physical "image" of the object placed in its "field." It reveals visual, physical properties. There are shown shapes, sizes, colors, arrangement, relative position and perfection of parts, details of particular markings or appearances on surfaces, peripheries, or transparent interiors, which are due to peculiarities of structure, composition or treatment. These are brought out visibly with progressive fineness as the power of magnification is increased. They are all, directly, physical revelations. Compare Figs. I and II; also Figs. III, IV and V.

### 4—THE EXTENT OF SUCCESSFUL USE DEPENDENT UPON THE OBSERVER

While it is the function of the microscope, as an instrument, to make physical revelations, the sphere of its use includes not only the physical but that part of the chemical world which can be inferred from visible physical changes. The observer may lay hold upon the maximum possible benefits in direct proportion to his ability to connect his physical and chemical knowledge with "what he sees," and with his microscopical "technique" in making visible, by proper treatment of the object, all or any of those things or properties located in it, which he may be able to use in making his deductions. He may gather his facts, at times, from the observation of a single condition of the object, or, at others, by comparing observed changes in physical appearances in successive fields, upon treatment of the object with differentiating conditions as of heat, light, pressure, solvents, reagents, etc. With the lower powers of magnification, the microscopic appearances are closely akin to those of ordinary vision and interpretation of them (i. e., recognizing what



is seen) is therefore easy. As the power of magnification becomes higher the details become more minute and more unrelated to familiar everyday appearances. Then the observer must familiarize himself with these appearances and apply his knowledge to the specialized cases before him, as from a new viewpoint. Microscopy draws heavily upon the observer's knowledge of optical physical and chemical properties, and of the effects of physical and chemical agencies upon these properties. The study, upon proper interpretation, shows conditions as they are, what goes on during treatment, and what are the results of the treatment.

#### 5—SOME SPECIAL APPLICATIONS OF THE MICROSCOPE

With these suggestions in mind as to the function of the microscope and as to the general factors and properties of objects which it uses in making its revelations, more specialized applications can easily be seen. It is obvious that these microscopical characteristics are to be found in many reagents, chemicals and materials, and, if one will but acquaint himself with them, may be used in laboratory testing, in workroom control, or research, in connection with the manufacture or use of leather, textiles, rubber, ceramics, metals, minerals and ores, and in the preparation or mixing of powdered materials, emulsions, suspensions, colloids, etc. Some of the recorded

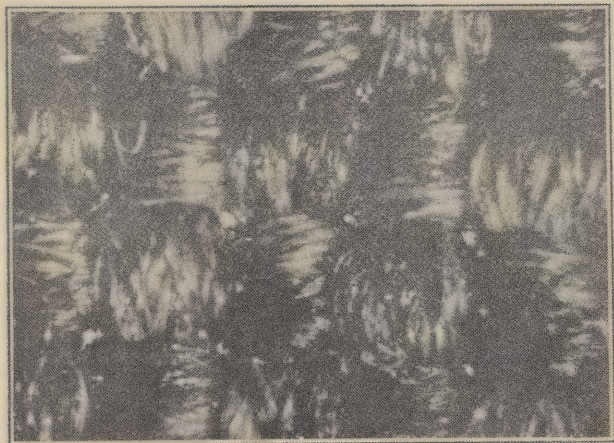


FIG. VI—*Worsted Cloth*

applications of the instrument may be suggested under the following heads. Other possible uses will undoubtedly occur to the reader along his own lines of work.

#### *A—The Microscope as an Aid to Working Operations*

(a) *Fine Manual Labor.*—There are many cases in industrial life where it would facilitate the carrying out of the work if the range of sight could only be extended a moderate amount, so that the workman could see better what he has done and is doing; where he could work more accurately and rapidly if he could only see distinctly the relative position of the instrument with respect to the piece of material; where the minute part he is replacing is to go; whether the place is in proper condition. Thus,

in engraving, repairing, adjusting or setting of cutting tools<sup>2</sup> and instruments, inspecting, mending fine fabrics, and such like, are found splendid opportunities for using low powers of magnification. The fact that microscopes suitable for this kind of work can be placed into almost any style of mechanical holders possessing convenience for specialized purposes, is a further help in making their employment easy and satisfactory.

(b) *Fine Reading Operations.*—The reading of fine graduations or other distinguishing marks and characters on instruments, records, labels, tags and containers, etc., is done much more easily through the microscope than with the naked eye. Many times, on account of partial effacement through corrosion, erasure or stains, or because of being located in a place poorly lighted or one hard to get at, a microscope will help a great deal. The microscope can often perform good detective work in revealing the presence of erasure or abrasion marks, alterations or differences in writing, the presence of foreign fingerprints, the substitution of kinds of paper, etc. In all of these kinds of cases the operation of the instrument is simple and the characters for the most part easily recognized. Little special experience is necessary, because the appearances are closely related to those of ordinary vision.

(c) *Microphysical and Microchemical Testing.*—As a laboratory instrument, Chamot,<sup>3</sup> a leading chemical microscopist, considers the microscope second in importance only to the analytical balance, because of the great variety of uses to which it may profitably be put with an almost equal degree of ease. The carrying out of the usual physical and chemical tests where a visible change is relied upon can frequently be done under the microscope with a great saving of time, material and reagent, without sacrificing accuracy. In cases of small quantities, as when unweighable amounts are at hand, the accuracy of the test may be augmented. Micro testing has several ardent supporters, and furnishes a broad field of possible, useful applications. The determinations of relative solubility, melting points, refractive indices, action with polarized light, crystalline form, spectrum formations, colorations and the computing of weights (from measurements and densities) have all been done to advantage.

Qualitative analysis, using tests involving differential solution actions, precipitations and actions mentioned above, as well as micro quantitative applications of methods in oil, powders and ground materials, has been done with good satisfaction. In the testing of dyestuffs upon fibers, in determining the presence of foreign matter on fabrics (stains, finishing materials, etc.) due to solid particles in the interstices of the fibers or threads, in the examination of insoluble residues extracted from commercial trade compounds, etc., a suitable selection of proper methods for further testing, or a clue as to origin, com—

<sup>2</sup> Article by Rogers: "Microscope in Workshop."

<sup>3</sup> Chamot, *Elementary Chemical Microscopy*.

position, method of application or proper course of remedy may be gained which will be of great service. A sight of the true condition often has a marked effect upon our course of reasoning and action.

As an illustration of an instance where the simple process of a microscopic examination would have given conclusive evidence as to the real cause of trouble, with the saving of a considerable amount of time, labor, material and irritation, there comes to mind the case of an olive-drab fabric with a surface appearance of uneven coloration. The appearance suggested very strongly the presence of a slight surface nap which had subsequently been dyed a darker shade than the main body of the fabric. The dyer claimed it was due to abrasion in the bleaching operations. The bleacher, naturally enough, denied the charge. He nevertheless took the precautions to inspect, thoroughly clean and smooth off his machinery. The condition of the dyed fabric was not improved. After several pieces had been put through with no improvement, outside advice was consulted. The simple procedure of putting the cloth under a microscope showed the cause of the trouble immediately. The surface of the cloth was undamaged, but there were very tiny blue specks pressed onto the surface fibers. The fabric had been dyed with sulphur colors. A test, under the instrument, for sulphur colors eliminated the specks and proved them to be dyestuff. The dyer by using more care in his solution process eliminated the trouble. If he had used the microscope on the first piece he would have been able to save himself much trouble.

It is very evident, then, that the microscope may be made to do valuable service in the laboratory or work-room as an aid to micro-testing, and in aiding the solution of problems requiring the use of other methods as well.

#### *B—The Microscope in the Control of Raw Materials*

The microscope may often be used to advantage in selecting and in controlling the quality of raw materials. It may do valuable service in identification of kinds, origin, composition to show purity, admixture or adulteration, grade, conditions of ripeness (vegetable fibers), uniformity, damage or previous treatment. Compare Figs. III and IV. Its suitability for the given purpose may at times be judged by its appearance, also the need for further preparation, mixing, etc. The presence of infectious or other deleterious matter may show itself.

Some observers have applied the instrument to determining the seam origin and quality of coal. Further applications to animal and vegetable products and to mineral, abrasive and coloring powders, organic and inorganic in origin, are met with.

In these cases much is often made of measurement and comparison of the appearance of the submitted samples with those of a standard sample which has proven satisfactory. The experience necessary to interpret, naturally,

varies with the kinds and conditions of object. The more characteristic the appearance—that is, the fewer the number of objects which possess the same or closely similar appearances—the easier is the problem.

#### *C—The Microscope as an Aid in the Controlling of Processes*

There are some processes in which the microscope finds good usage. It may be to tell the need of a material for the process in question, or to determine the extent to



FIG. VII—*Worsted Yarn*

which it has gone on and how near to completion it may be, or in noting the presence and tracing down an abnormal action in its operation. Some investigators make a systematic study of the normal effects upon the material of the well-working process under proper conditions of concentration, reaction, temperature, pressure and machinery. They do some research work upon the effects of abnormal conditions and find the information from both cases often of help in controlling the process. One worker follows the material (in this case working with cotton) from one process to another, and finds it profitable to do so.

Such processes as those using surface coatings, infiltrations, penetration, subdivision and cleansing may show information of value when studied systematically. If any of these have been improperly or insufficiently done, or damage, imperfection or other difficulty has been encountered, the microscope may be of service in detecting them and in finding a remedy. In research study for the improvement of a process, the effects of varied conditions and kinds of materials may be studied. In yarn study the twist and uniformity may be observed minutely. See Fig. IV.

#### *D—The Microscope Applied to Machinery*

With machines using very fine, engraved depressions or fine, elevated ridges, like the shiner calendar rolls, to

<sup>4</sup> T. P. 211 Bureau of Mines; Coghill & Bonardi, Quantitative Microscopy of Powdered Ores.



produce modifications in the appearance of the material, the microscope has been used to note imperfections in manufacture or those subsequently caused by breakage, filling in of the spaces, etc.

In the operation of machines requiring fine adjustments, as tool lathes, a microscope has been employed to reduce the need for calipers. It is claimed that better accuracy is obtainable with less time consumed.

*E—The Microscope Used in the Study and Comparison of Finished Materials*

The study of finished products to learn their normal structure, composition and weaknesses, and to compare them with standard samples or with various methods of production, and to detect methods of treatment or to test their properties, has frequently been done. The changes in appearance or in composition, or their contamination, in handling and storage, can many times be observed through the microscope. See Figs. V, VI and VII.

*F—The Microscope an Aid in Making Authentic Records*

The opportunities for the use of the microscope in straight visual examination are frequent, but, if there be added to that the making of authentic and permanent records by taking photographs through the instrument, the total number is greatly increased. It often happens that the materials themselves can be seen with the eye plainly enough, but in making records it is better to use the microscope. The field is a highly special one technically called "photomicrography." The use of the records in buying, selling, comparing, instructing and in aiding the settling of disputes in and out of court, may be of great advantage. They show things as they are and leave little room for conjecture.

6—SUMMARY

The microscope is seen, therefore, to possess great values in industrial work when used to its maximum possible extent in a given industry. While a large number of uses are on record and the necessary instructions for carrying out the tests and the needed information for interpreting what is shown in these cases are given, there are many other uses which as yet are in the hands of but few individuals. Other uses can also be recognized and employed if the necessary thought is put upon them to adapt the method and study and record the data. Much individual work is still to be done. From written descriptions it often seems as though the task is difficult and tedious, but very often it is, in reality, straightforward and simple. In view of its many diversified uses in connection with raw and finished materials, processes, machines, working operations and the making of records, and on account of the rapidity and economy in its operation, it is an instrument worthy of general, renewed interest and more searching endeavor to extend its application to industrial problems.

*(Part II will follow in the next issue.)*

## BRAZILIAN DYESTUFFS

Brazil possesses almost an endless variety of vegetable dyes, ranging from deep black to the faintest yellow and rose. Its very name comes from the fiery red (brazá) color of the pau Brasil, the Brazil wood of old-time commerce.

Indigo, locally known as anil, grows spontaneously throughout Brazil. It was cultivated extensively during the Colonial period, when thousands of tons found their way to Europe. To-day its cultivation has been practically abandoned, as the foreign demand has ceased. The plant still grows wild.

Pio cravo, found in all the States of the Republic, but most prevalent, apparently, in Espírito Santo, yields an intense black dye. It is extensively used in households throughout the interior of Brazil for dyeing cotton cloth. A deep black dye is also obtained from a small tree—which furnishes a dark-hued coloring material used successfully in certain interior sections as a hair dye.

Anil assu yields a blue-black dye bark of the tree known as brauna, Maria preta, or grauna. The sap is very similar to that of real indigo. It is said to be easier to extract the dye from this variety than from real indigo. The plant is found in an abundance.

Anil trepador, or climbing indigo, which occurs in two varieties, produces a rich, blue dye, much used by the Indians. Brincos de Princeza, found in Minas Geraes, Rio de Janeiro, Bahia and Espírito Santo, yields a black dye; while a dye of inky blackness is obtained from the camarambaia, occurring in Bahia, Minas Geraes, Rio de Janeiro and Rio Grande de Sul. Fuchsia, abounding principally in Minas Geraes, also yields a black dye, as do negreira and macucu of maca de fogo.

The arariba yields both a yellow dye and a blood-red dye, used in cottage industry for coloring nets, hammocks and baskets. A red dye of exceptional fastness is obtained from the juices of the fructos de pacova found generally throughout Brazil. It is often used as a writing ink. Pau sangus, found generally throughout the Republic, and candua, a lichen occurring in the State of Minas Geraes, both furnish blood-red dyes.

Red dyes of various shades are also obtained from the catigua, sangue dedrago, urucurana, and both bark and wood of the tree known variously as roxinho, pau, roxo or guarubu. Carajura, or carajiru, a creeper abounding in the Amazonian regions of Brazil, is a favorite source of coloring matter from the juices of the plant. A decoction of the leaves deposits after boiling a fine red powder, which is regularly sold in the native markets.

From the root of the gravata de tingir is obtained a yellow dye used extensively by the Indians. It is present in quantities in the States of Rio de Janeiro, Espírito Santo, Minas Geraes, Alagoas and Ceará. Yellow dyes are also taken from Cruz de Malta, such as tatagibo de brejo, tatagiba de espinho and tatauba.

# Piece Dyeing Woolens and Worsteds

Necessity for Co-operation Between Dyer and All Departments—"Blaming It on the Dyer"—A Simple Test for Working Qualities of a Color—Some Causes of Clouded Goods—Improper Scouring Methods—Impurities—Carbonizing Before Dyeing—Speed of Reels

By H. J. FISK

THE piece dyehouse has always had the experience of running smoothly for a time and then the word comes that the dyer is wanted up at the perch in the shipping room. We know well that it means the beginning of another polite (or otherwise) controversy that is going to reach every part of the mill before it is finally laid to rest.

The simplest complaint that can be made is that the goods are cloudy and streaked, and, of course, that must be the dyer's fault. The dyer takes account of the colors he is using, and if he finds by a laboratory test that the fault lies with the dye the matter is settled and the only question is why he didn't know that beforehand. It often happens that a dyer has been using a certain dye for years, allowing a purchasing agent in the office to obtain his supplies at the best possible price. One day he is visited by the representative of some new concern which is endeavoring to gain an outlet for its product. The price is attractive and the strength appears equal to the standard, so an order is placed and before he realizes it the dyer is using the new dye under conditions where it is perfectly satisfactory. One day, however, its use results in trouble and everybody finds out, to their amazement, that there was a deficiency in some respect that no one had ever considered—but the dyer gets the blame anyhow.

## TEST FOR WORKING QUALITIES

The best test for the general working qualities of any one color is to have a formula made up of three tried and proven dyes which will make a neutral gray. Say, for instance, we use Alizarine Saphirol, Fast Light Yellow 2G and Alizarine Rubinol in such proportion that they dyed a neutral gray. The color to be tested is substituted for its corresponding color in the mixture and it becomes very easy to note its relative leveling power, fastness, tone strength, etc. A simple laboratory test of a 1 or 2 per cent dyeing of any dye does not give us much valuable information, but the weak points become very evident when it is used in combinations.

## CAUSES OF CLOUDED GOODS

It is seldom, however, that the dyer does not know the working qualities of the dyes he uses, and most of the complaints become real problems that need careful investigation as to the cause.

We may review a few of the causes that result in

clouded goods, for when the cause is found the remedy is near at hand.

Variations in the wool composing either warp or filling will cause bars that follow the threads and are easily recognized.

## IMPROPER SCOURING METHODS

Scouring is perhaps the greatest cause of faulty dyeing. Scourers will use strong alkalies and excessive heat, because they feel that such means are necessary to clean the goods. Sometimes they are. The writer knows of a mill that insisted on using a mineral oil emulsion on their wool mixings because it was cheap and they could not be convinced that whatever they saved on oil was wasted many times over in scouring and dyeing costs. Oleic acid (red oil) and sulphonated oil make a very efficient emulsion that actually helps the scouring. The action of soda on the wool is such that if it does not actually harshen it and make it feel "haspy," it does alter its affinity for dye and may easily put the scoured piece in such a condition that the best leveling dyes ever known will give cloudy pieces. The dyer should note in a case of this kind whether the trouble is all on one piece or whether the entire set are the same. If several pieces on the set are good and others bad, it is not the dyer's fault, because if the dyer were at fault all would be the same.

## IMPURITIES IN GOODS

It is hardly necessary to comment on bad water, lime soap and other impurities that interfere with good dyeing, because so much has been written already. It may be suggested, however, that if the dyer suspects such causes he would do well to run the goods up to a boil in the kettle with 1 per cent of ammonia or 2 per cent sodium phosphate before dyeing. It will be surprising how much matter he is able to remove from goods that were sent to him as being clean.

## CARBONIZING BEFORE DYEING

Some few mills carbonize before dyeing—a very bad procedure, as there are many opportunities to alter the nature of the fibers and foster uneven dyeing. Carbonizing after dyeing seldom gives any trouble unless dyes have been used that are sensitive. Speck dyeing is a very prolific cause of streaks, particularly if the goods are left any time before drying. They should be



extracted and dried as soon as they leave the speck dye kettle.

In dyeing tricotines or other goods where the face of the goods is easily marred by overwork or friction, it is customary to "bag" them by sewing the selvages together, with the face of the goods inside. This also prevents the lists from curling up into hard rolls that show light streaks with any dye that is inclined to work rapidly.

It is an open question whether it is better to charge the kettle fully with all the ingredients and slowly raise to a boil, or to omit the acid or chrome, or whatever determines the taking on of the color, and raise to near a boil and then feed the acid slowly. Good results are obtainable in both ways.

#### SPEED OF REELS

The speed of the reels is a factor. If the goods travel in rope form at a high speed there is tension which results in creases that tend to remain throughout the entire dyeing operation. With the proper speed the folds, falling in the back of the kettle, will open out more or less and allow every part of the goods to be outside at some time or another, and thus give a greater uniformity of contact with the dye liquor. Too slow speed will subject the lower layers to the action of the hot steam for too long a period, and at the critical stage, when the dye is just beginning to take on the fiber, this may easily cause clouds.

With after-chrome dyes it must be remembered that many of them develop rapidly, and we must avoid adding the chrome too fast or we shall overchrome some parts, while others will have a deficiency and a different color.

Washing must be thorough, because any trace of chrome or salts left in the goods may cause color changes in the finishing or sponging operations. The heat of drying will cause color changes in those parts of the goods where foreign materials are present. Heat will alter almost any color, but when the wool regains its normal moisture the shade generally comes back.

These few points will indicate the many possibilities of trouble arising in the dyehouse, and it is hoped it will show the necessity of co-operation with the dyer by all departments of the mill. Redyeing is something that nobody likes; the dyer resents it, the finisher objects to trying to do good work on redyed pieces, and the management deplores the extra cost and waste.

Sometimes they put all these problems up to the technical man of a dyestuff supply house; sometimes he is able to straighten matters out and sometimes not.

The Atriken Chemical Works, New Brunswick, N. J., has leased three buildings of the former plant of the Hewes & Phillips Iron Works, Orange Street, Newark, N. J., and will remove its factory to this location. Possession will be taken at once.

#### MOTH-PROOF WOOL

The following abstract published by the "Journal of the Textile Institute" supplements the report of U. S. Consul Wallace J. Young which appeared in *The Reporter* of January 30, 1922, page 100. It summarizes an article by E. Meckbach in "Textileberichte," 1921, 2, 350 and 373:

A preparation named Eulan F. has been produced by a German company. It is an odorless powder, slightly soluble in water. Wool is saturated with a solution of 6 grams Eulan per liter, with the addition of 3 grams concentrated sulphuric acid; in the case of half-wool, formic acid is used, and after several hours well rinsed. The wool is not affected, and only a few colors are slightly changed, but may be corrected by after-treatment with ammonia. Frequent washing and even slight scouring with soap and tepid water fails to remove the protecting influence. Stronger scouring with warm alkalies has an adverse effect. In one test two tubes were filled with loose wool, one treated with Eulan and the other untreated: 50 moths' eggs were placed in each. After six months the untreated wool had completely disappeared, whereas the Eulan treated wool was intact.

#### TESTING DYES FOR COLORED PAPER

By B. K. STEADMAN

Assume that pink paper is being made with a known grade of Safranine with the known one. We weigh out equal amounts of these dyes and make each up to the same volume with distilled water. The amount of color in any given volume of water can then be easily calculated. Example—Suppose one quart of water contained 0.5 ounces of dye, then one ounce of water (liquid ounce) would contain 0.0156 ounces of dye. (One liquid quart equals 32 liquid ounces.)

Now, if the above paper is being made with 50 per cent rag stock and 50 per cent bleached sulphite and 16 ounces of Safranine are being used per 1,000 pounds of air dry stock; then to make laboratory samples on the same basis, we use one ounce rag stock one ounce sulphite (both air dry) and 0.002 ounces—or 0.057 grams—of dry color, or its equivalent in water. In the same manner the amounts of filler, mordants, etc., would be figured.

The stock is shaken in a fruit jar containing some water and small pebbles, or shot and then transferred to a big bowl with a definite amount of water. The color, size, filler, etc., are added in the same order as on a mill run and all are then well mixed with an egg beater or something similar.

Some of the pulp is then poured on the edge of the Fourdrinier wire and covered with a piece of dry soda pulp (smooth side down) and run through the couch rolls, then through the first press rolls. It is dried by hand on one of the dryers and is finally calendered.

I have made numerous tests in the above manner, and have compared results with paper made in the

mill on a large scale. There is little difference between the shades of paper made in each case if equivalent amounts of the various dyestuff, mordants, etc., are used, and if proper precautions are taken.

To carry out the above test the following apparatus is necessary:

1. An accurate chemical balance.

2. Some porcelain cups or several glass beakers.
3. A small watch glass in which to weigh the samples of dye.
4. A large bowl.
5. Several graduated flasks (glass).
6. Several measuring graduates (a few pipettes would also be useful).—Dyer & Calico Printer.

## Modern Views on Soap

### Part II

Use of Soaps—Nature of Scouring Processes—Electrical Effects—Emulsions—Adsorption and Scouring—Amount of Soap Used in Scouring—Additions to Soap Baths

(Continued from page 113.)

By CHARLES F. GOLDTHWAIT

*Chemist, Klearflax Linen Rug Company, Duluth, Minn.*

#### THE USE OF SOAPS

IN the practical use of soaps the first property to interest us (aside from strength and price) is solubility. With a fatty acid and different bases the ammonia soap is the most soluble, although little used outside of softeners; the potash soap is next and the soda soap third. As an example, Matthews<sup>5</sup> states that potassium oleate is about two and one-half times as soluble as sodium oleate. Since solubility varies with temperature and other conditions, it is a somewhat difficult term to define. While we have already reviewed the matter of solubility from the more scientific standpoint, we believe that what is understood in practice by the term is something more like the ease with which a soap will mix with water to a suitable strength or consistency for the particular work in hand, and the ease or difficulty with which soap remaining in the treated goods can be removed by rinsing. Unless otherwise specified, our future use of the term solubility will be in this general sense.

The thickness or viscosity of soap solutions is another of the more obvious properties. It is primarily due to the fact that the soap colloids are heavily hydrated or solvated, in somewhat the same way that copper sulphate takes up crystal water and is present in solution as hydrated ions.

The value of a soap has always been associated with its lathering power but it appears that lathering is not a cause of the cleaning effect, although it is a parallel property and is an indication of what can be expected. Fischer<sup>1</sup> states, "The production of a foam is best accomplished when the soap is present in a medium concentration and when the resulting system is essentially a liquid hydrated colloid." Soaps in true solution lose

their foaming qualities, nor is lathering shared by the harder gels. Soaps from the fatty acids from the middle of the series foam the easiest of all and do so at ordinary temperatures.

#### NATURE OF SCOURING PROCESS

Shorter<sup>6</sup> has given excellent interpretations of the scouring process and after briefly reviewing his work the necessary properties in the soaps can be better understood. First, it is necessary that the soap or other detergent solution wet the dirt rather than merely running away from it as water does from a greasy frying pan. The solution must next have a tendency to "lift" the dirt and carry it into suspension, and finally it must hold the first dirt while still further quantities are taken up from the material being scoured, so that the dirt or grease can be ultimately removed.

Soap helps water wet greasy surfaces or fibers by reducing the surface tension. All liquids have this property of surface tension and the more they have the less easily will they spread, as it acts like a rubber skin pulling any small amount of liquid toward the form of a drop. Mercury is an example at one end of the scale and the tension is sufficient to hold it as a globule; water has less tension and can spread to a thin layer while kerosene and other fluid oils can spread almost indefinitely. That is, as surface tension decreases the liquid tends to spread and wet more surface.

Wetting a piece of cloth involves three substances—cloth, air and water. If we have dry cloth and water separately there are two kinds of surfaces, one separating cloth and air and one, water and air. When wet, one kind of surface has disappeared and we have cloth and water with usually an extra amount of surface between

<sup>1</sup> Fischer. "Soaps and Proteins." Wiley, 1921.

<sup>5</sup> Matthews. "Bleaching and Related Processes." Chemical Catalog Co. 1921.

<sup>6</sup> Shorter. Articles on the scientific principles of scouring as published in the Journal of the Society of Dyers and Colourists, Textile Institute Journal, etc.



water and air. The process of wetting consists, therefore, of this change.

Each surface tends to contract because of its surface tension just as water tends toward drops, so there will be a struggle between the cloth-air tension on the one hand and the air-water and cloth-water tensions on the other. If the former, cloth-air tension, is greater than the sum of the other two the cloth will be wet; if less, it will not.

Substances of a greasy nature have a low surface tension and it is difficult to wet them. This, of course, includes the oil in any piece of fabric. In scouring, it is therefore necessary to add to the water something that will reduce the water-grease and water-air tensions. Soap lowers both; it thus assists in wetting the grease and allows emulsification to begin, followed by release of the dirt. Dirt particles might easily redeposit on a complex body like a piece of cloth but are kept from doing so by the Brownian motion.

#### ELECTRICAL EFFECTS

While it is rather difficult to separate electrical effects very sharply from some of the other phenomena of colloid chemistry, according to Shorter, they have a rather special influence. If a piece of cloth is dipped into water it ordinarily acquires a negative electrical charge and the liquid assumes an equivalent positive charge. The fine dirt particles in a wash water are also charged negatively, and since like charges repel each other, there is a tendency toward preventing the particles from collecting together or coagulating, and from redepositing on the piece. The vigor of the Brownian motion depends on the smallness of the particles and this activity is assisted by the electrical charges.

The effectiveness of alkali in a scouring liquor is usually attributed to the formation of a soap either by neutralization of free fatty acid or by a slight saponification of neutral oils. While this is important and will receive its share of attention, the alkali has other valuable effects that must not be overlooked. Experiments have shown that the addition of small amounts of alkali to such aqueous suspensions increases this charge while acid diminished it. Therefore dilute alkali tends to stabilize a suspension while acid tends to coagulate it. Ordinary detergent solutions are always alkaline either by added alkali or hydrolysis alkali from the soap. This also tends to maintain the dirt and grease in suspension and to assist in the emulsification.

#### EMULSIONS

While definitions are a bit dry they serve to clarify matters and to reassure us that we are thinking about the same things in the same way. An emulsion is a suspension of fine particles of one liquid in another, as of fat globules in water. It does not properly include dirt suspensions, but according to Fischer a simple soap solution itself is or behaves very much like an emulsion. Since

one of the principal factors in scouring is emulsification it should be thoroughly understood. The formation of an emulsion can be easily illustrated by shaking a little oil with water. It mixes in the form of very fine drops but separates out again rather quickly. We get an emulsion but it is not stable. By the addition, however, of certain substances to the water the effect can be modified in two ways: First, to prevent the coalescence of the oil droplets, and second, to cause the oil to be split up into much finer drops for the same degree of shaking. Some emulsifying agents produce both these effects and some only the first.

In getting at the cause of emulsification we come upon the important property of adsorption, not absorption, like a rag soaking up water, but adsorption—the rather mysterious property by which so many things cling in minute amounts to the surfaces of other things. For example, dyeing is largely adsorption of dye by fiber. So is the retention of acid by carbonized wool which may occur if goods are not very carefully neutralized. In a similar manner, dissolved materials tend to concentrate on liquid surfaces and assist in lowering the surface tension which in the case of water may be reduced to one-third by adding 2½ per cent of soap. This imparts a threefold ability to wet-out which may arise in two different ways from such adsorption. Soap from the solution may be adsorbed at the surface of contact of soap solution and greasy cloth, or an increased concentration of soap in this layer may result from the interaction of hydrolysis alkali in the solution with free fatty acid in the oil.<sup>7</sup>

Lathering power of soap is due to the “surface activity” of the soap solution against air and does not necessarily measure its “surface activity” against grease. Ordinary soaps, however, exhibit both effects and lathering power is some measure of the detergent power. It is possible, however, that a colloidal solution may be a good detergent and yet possess little ability to form a lather.

#### ADSORPTION AND SCOURING

Adsorption both helps and hinders in scouring. We have said that the colloidal nature of soap gives it a protective action which tends to hold fine dirt and grease in suspension. Here again is a case of adsorption. As soon as particles of dirt and droplets of oil are free in the solution they attract some form of soap from the solution to themselves forming an encircling film that keeps them from going back on the goods or coalescing into large groups. In other words, as we have already stated, the grease is emulsified and then the emulsion is rendered stable until it can be run off. If the dilution that accompanies rinsing is done carefully enough, very little of the matter that has been removed will go back to the fiber.

Adsorption appears still again, but this time in not so favorable a role. Much dirt seems to be fixed on textiles

<sup>7</sup> Shorter. J. S. D. C. April, 1916.

by adsorption and it is necessary that the soap take its place before it can be removed. The soap itself is then very difficult to remove and there is nearly always at least 1 per cent left in the goods, even under the very best conditions<sup>8</sup> of scouring and rinsing.

#### AMOUNT OF SOAP

The amounts of soap to be used in scouring have been stated from the physical-chemical point of view, but it will be left for each reader to decide as to the correctness of these strengths. Judging by the surface tension effects, the best concentration is 0.4 to 0.5 per cent and this is stated to correspond roughly with practice in England.<sup>9</sup> In laundry work<sup>8</sup> the best results are claimed to be obtained with 0.2 to 0.4 per cent solution strength. Other statements run from 0.15 up to about 1 per cent. The proper soap strength depends on the kind of soap, also on the hardness of the water and the nature and dirtiness of the material.

In any kind of cleaning with soap it is considered necessary to have a permanent lather in order to be sure that the desired result is being obtained, whether the operation be washing dishes, shampooing the hair or scouring worsted pieces. It is customary also to add soap from time to time to reach or maintain this condition. Aside from loss of soap due to hardness of water or similar causes there is a familiar exhaustion of the soap bath by fouling. This can be explained on the general principles already stated.

Exhaustion of soap may be due to two causes.<sup>9</sup> The first is removal from solution through its adsorption on the goods as well as on the particles of grease and dirt. The main cause in scouring is fouling with grease and dirt, which by itself is not an explanation. Since exhausted scouring liquors still possess a fair degree of surface activity, fouling may mean that all that portion of the soap colloid which has the protective action, that is, which is adsorbed and helps keep the dirt in suspension, may have become used up. The property of lathering disappears at the same time. To all appearances the union of soap with dirt in the liquor takes precedence over the formation of foam at the surface until all the dirt has been taken care of.

#### ADDITIONS TO SOAP BATHS

Other materials are frequently added to soaps used in scouring and as a rule they should be added at the mill where they can be controlled, rather than purchased as more or less doubtful mixtures.

Most widely used is soda ash, which has definite useful functions. It brings about the desired lowering of surface tension at less expense than by soap alone. Its other effects are similar to those where soda ash is used by itself. Theoretically, where there is any free fatty acid

in the oil and any free alkali in the scouring bath they will combine and form a soap which will then be just as effective as if it had been bought as such and added to the liquor. Such a method of working means an economy as the oil serves two purposes.

A few special conditions must be fulfilled for practical success. In such scouring it is better to add the alkali slowly until enough soap is formed and *dissolved* to produce the stabilizing effect. Gradual addition of the alkali gives better emulsification and scouring. An oil must contain at least 30 per cent free fatty acid to scour off a piece with alkali alone. Naturally, red oil is the best for oiling wool that is to be scoured in this way. Perhaps no small factor is the effervescence of carbon dioxide at the surface of the goods.<sup>11</sup>

When pieces are scoured with alkali alone the emulsification is due to the formation, in the surface layers separating the solution from the oil on the piece, of a layer of soap by the interaction of the alkali and the free fatty acid in the oil. The stabilization of the emulsion is due to the passing into solution of the soap thus formed.

Added alkali tends to increase enormously the surface tension effect even against mineral oils, but it also tends, if its concentration exceeds a certain small amount, to diminish the stabilization effect. A compromise is usually adopted in the direction of sacrificing stabilizing effect to rapid initial emulsification.

If the alkali is too strong in proportion to the amount of soap present it will start to "salt" it out and there will be only curdy masses of soap at the end of the process with none in solution.

Some of these relations have been given in more definite figures.<sup>12</sup> No distinction appears to be made between cases using soda alone and those where soda ash is used in soap solutions and, in fact, after scouring has proceeded for a short time there is very little difference between them. Alkali equal to a 3 per cent solution is considered about the limit. It can be used where the wool oils contain large proportions of fatty acids. If the strength runs up to 3½ to 4 per cent (7 to 8 deg. Tw.) the soap remains largely on the pieces and does not exercise much scouring effect until the rinsing when the soda is removed and the soap dissolved. If down to 2 per cent, there is more likely to be a good lather and good scouring. The use of a weaker alkali and scouring in two stages is recommended for the more difficult cases.

An example is Schofield's<sup>11 12</sup> multiple scouring process where the goods are run for a few minutes with soda ash and the liquor run down the drain without adding any rinsing water, then further alkali and soap solutions are added and the scouring completed. The superficial and heavier dirt comes off in the first operation and is at once removed from the sphere of action, then the more penetrated and embedded oils and dirt are removed in

<sup>8</sup> H. Hey. J. S. D. C. July, 1921. Page 184.

<sup>9</sup> Shorter. J. S. D. C. March, 1919. Page 56.

<sup>10</sup> One of the best recent discussions on the nature and properties of soap solutions is found in the Third Report on Colloid Chemistry of the B. A. A. S. 1920.

<sup>11</sup> Schofield. J. S. D. C. December, 1921. Page 300.

<sup>12</sup> Schofield. "Scouring and Milling." Netherwood, Dalton & Co. 1921

<sup>13</sup> Schofield. J. S. D. C. April, 1921. Discussion by Shorter, page 106.



the second stage of the process and the final scouring is accomplished in a cleaner liquor.

A very interesting experiment confirming some of the more recent research was performed by Jackson in 1907. Some very dirty linen fibers were enclosed in a cell containing water, under a microscope. Particles of dirt were seen to detach themselves and start vibrating in the water.

When the water was replaced by soap, a larger number of particles broke away and vibration was more active. When the soap solution was replaced by salt, movement was almost completely stopped. By the same method a certain amount of alkali was seen to be helpful while an excess acted like salt in tending to retard the activity.

(To be concluded.)

## The Chemical Constituents of Raw Cotton

By ROBERT GEORGE FARGHER, D.Sc., and JOHN CHARLES WITHERS, Ph.D.

*The British Cotton Industry Research Association*

[Note—Figures in parentheses refer to Bibliography on pp. 120 and 169.]

(Concluded from page 120.)

### VII. THE PROTEINS OF COTTON

THE occurrence of nitrogen in cotton fiber seems to have been first mentioned by Schunck (4), whilst the presence of protein may be demonstrated by Haller's method (8). Our present knowledge is, however, rather of the disappearance of the nitrogen during extraction and bleaching than of the actual nitrogenous constituents.

Typical estimations of nitrogen are quoted by A. Schindler (37) as follows:

Egyptian, raw .....	0.250 - 0.256%
American, gray, yarn .....	0.138%
Texas, raw, cleaned .....	0.150%
Peruvian, red .....	0.280%

*Action of solvents*—Knecht (24) has examined the removal of nitrogenous constituents by extraction with a number of solvents, his results with an American cotton containing 0.204 per cent being as follows:

After Successive Extraction with	Nitrogen Content	
	American %	Egyptian %
Benzene .....	0.189	0.240
Alcohol .....	0.184	0.226
Water .....	0.175	0.218
Ammonia (dilute) .....	0.175	0.218
Formic acid (dilute) .....	0.168	0.211
Hydrochloric acid (2 deg. Tw.)	0.138	0.175
Bleaching powder (2 deg. Tw.)	0.022	0.037

Treatment with inert solvents thus accounted for 14.1 and 16.7 per cent of the nitrogen in the respective complex, and chemical treatment for 72.3 and 71.3 per cent.

*Role in dyeing*—Knecht and Fernandez (26) have suggested that as an albuminoid has been obtained from raw cotton, dye affinity may be attributed to a definite substance, and in this connection it is worth recording that R. J. Flintoff (38) has discussed the function of added

albuminoids as fixing agents in the dye bath. Haller (38a) has also shown that there is a substance in the cotton hair which has an affinity for stannous chloride.

### VIII. PECTIC MATERIAL

Schunck (4) isolated from amongst the products removed from cotton by the soda-ash boil considerable quantities of a substance corresponding with the "*parapectic acid*" described earlier by Fremy. More recently, Knecht (24) obtained a similar product from the caustic soda boil which had been previously lime-boiled and soured. The material so obtained has received little attention, and the considerable literature on such products which has accumulated during the last decade is concerned chiefly with the pectic substance of sugar beet and of fruit juices.

*Pectose* is probably closely allied to cellulose. Fellenberg (39) has suggested that it exists in unripe or barely ripe fruits as a product insoluble in water which is neither a calcium salt nor a glucoside derived from pectin. It is readily converted by cellulose extractives into pectin and pectic acid, and by fermentation with pectase into pectin (vegetable jelly), the chief constituent of Irish moss. This fermentation is an important process in the retting of fibers such as flax, *B. amylobacter* and *B. comesii* being regarded as the active agents.

Fellenberg states that pectose is probably converted into *pectin* in ripe or over-ripe fruits. The latter swells and dissolves in water, but the viscous solution soon sets to a jelly. Pectose is a reversible colloid, not coagulated by silver nitrate, mercuric chloride, barium chloride, or a number of other salts, and with extremely pure pectin there is no coagulation even with alcohol.

On treatment with warm dilute sodium hydroxide, pectin loses methyl alcohol and is converted into *pectic acid* which is very soluble in alkali hydroxides, carbonates, or phosphates, and in most ammonium salts of organic acids. Ammonium oxalate gives a limpid solution, but alkali carbonates give mucilages. Its solutions in water are

(Continued on page 164.)

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

### *President*

LOUIS A. OLNEY  
Lowell Textile School, Lowell, Mass.

### *Vice-Presidents*

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ARTHUR E. HIRST      WILLIAM K. ROBBINS  
WALTER M. SCOTT

### FOURTH COUNCIL MEETING

The fourth meeting of the Council of the American Association of Textile Chemists and Colorists was held Friday, February 10, at the Engineers Club, Boston, Mass.

The following members were in attendance: Prof. L. A. Olney, William K. Robbins, George A. Moran, A. E. Hirst, William D. Livermore, William H. Cady, W. M. Scott, Winthrop C. Durfee and W. E. Hadley. E. C. Bertolet was unable to attend.

The minutes of the last meeting were called for, but the reading was omitted.

The matter of the incorporation of the Association was discussed, but it was decided to postpone such action until a later date.

The following applicants were duly admitted to membership in the Association in accordance with Article IV of the Constitution:

### *Active Members*

Arey, Helen L., 96 Columbus Avenue, Salem, Mass.  
Asst. to Chemist, Pacific Mills, Lawrence, Mass.  
Arnzen, F. E., Fall River, Mass.  
Supt. Plant No. 2, Fall River Bleachery.  
Brownell, K. A., 11 Rutgers Place, Passaic, N. J.  
Chief Chemist, Standard Bleachery Co.  
Bannan, F. E., 1720 Washington Street, Wilmington, Del.  
Dyestuff Demonstrator, Du Pont Co.

Burt, A. M., Rocky Mount, N. C.

Hosiery Manufacturing, Rocky Mount Hosiery Co.  
Carter, Stewart F., 77 Lafayette Avenue, Passaic, N. J.  
Textile Expert, J. Wolf & Co.

Currier, R. J., Box 178, Fulton, N. Y.

Supt. Dyeing, Fulton Mills, Fulton, N. Y.

Deady, William F., Box 158, Slatersville, R. I.

Foreman Dyer, Slatersville Finishing Co.

Forsdale, O. H., 57 Des Laurien Avenue, Webster, Mass.

Textile Chemist, S. Slater & Sons Co.

Estlow, J. W., Box 275, Schoolfield, Va.

Overseer Dyeing, Riverside & Dan River Cotton Mills, Inc.

Foss, W. C., Greenville, N. H.

Dyer, Columbian Mfg. Co.

Garnett, S. I., 12 Fort Avenue, Edgewood Station, Providence, R. I.

Calco Chemical Co., Boston, Mass.

Hannah, Jr., G. K., River Street, Fitchburg, Mass.

Textile Chemist, Parkhill Mfg. Co.

Hilton, W., Box 12, Apponaug, R. I.

Colorist, The Apponaug Co.

Le Portier, V. D., 220 West Street, Talladega, Ala.

Supt. Dyeing, Samoset Mills.

McKenzie, K. M., 66 Leonard Street, New York.

Converter Cotton Piece Goods.

O'Brien, Ruth, Ames, Iowa.

Asst. Prof. Tex. Chem., Iowa State College.

Proctor, B., 35 Everett Street, Arlington, Mass.

Chemist and Demonstrator, Kuttroff, Pickhardt & Co.

Sullivan, P. L., Rockingham, N. C.

Supt. Dye Works, Great Falls Mfg. Co.

Whittaker, F., Box 454, Magog, Quebec.

Works Chemist, Dominion Textile Co.

Wooffindale, W. H., 110 Grenada Terrace, Springfield, Mass.

Textile Chemist, Emerson Laboratory.

Zillensen, E. A., Belleville, N. J.

Manufacturing Chemist, Liberty By-Products Co.

### *Junior Members*

Bamberger, L. L., Providence, R. I.

Plant Chemist, Silver Spring Plant, U. S. Finishing Co.

Blades, A. H., 592 Haverhill Street, Lawrence, Mass.

Color Mixer, Pacific Mills, Lawrence, Mass.

Brown, Jr., W. G., Lowell, Mass.

Student, Lowell Textile School.



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Proceedings of the American Association of Textile Chemists and Colorists

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Caya, F., Lowell, Mass.

Student, Lowell Textile School.

De Nuccio, P. P., 53 Oak Street, Lawrence, Mass.

Laboratory Asst., Pacific Mills, Lawrence, Mass.

Fernald, B. B., 14 Elgin Street, Providence, R. I.

Chemist, Imperial Printing Co.

Holly, T. K., Shawsheen Manor, Andover, Mass.

Asst. Color Mixer, Pacific Print Works, Lawrence, Mass.

Runnels, H. N., Lowell, Mass.

Student, Lowell Textile School.

Schwarz, H. L., Lowell, Mass.

Student, Lowell Textile School.

Southwick, C. H., Lowell, Mass.

Student, Lowell Textile School.

Symmes, D. W., 10 Madison Avenue, Winchester, Mass.

Student, Lowell Textile School.

Worthen, C. T., 267 Groveland Street, Haverhill, Mass.

Student, Lowell Textile School.

The Council discussed the advisability of accepting several of the applicants for membership, and the Secretary was instructed to communicate with these prospective members, in order to obtain more definite information regarding their qualifications.

The Secretary was authorized to immediately send out, in accordance with Article IV of the Constitution, all names of recent applicants for membership.

The meeting was then adjourned.

W. E. Hadley, Secretary.

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### NEW MEMBERS

In publishing the names of new members in the January 30 Proceedings the designation of business was not included, but as it was later considered desirable the list is herein reproduced with the addition of the business affiliation:

#### *Active Members*

Bromley, Frank, Box 128, Apponaug, R. I.

Supt. Color Dept., Apponaug Print Works.

Chantler, Ambrose R., 364 Potter Avenue, Providence, R. I.

Technical Demonstrator, Du Pont Co.

Dempster, William C., 644 Greenwich Street, New York, N. Y.

Demonstrator, A. Klipstein & Co.

Emmett, James R., 92 Windsor Road, Waban, Mass.

Demonstrator, Special Products Co., Boston, Mass.

Linberg, George O., 50 Belmont Avenue, Springfield, Mass.

Demonstrator, Newport Chemical Works, Passaic, N. J.

O'Brien, Edwin J., 2207 Dorchester Avenue, Dorchester, Mass.

Color Chemist, Standard Color Co., Boston, Mass.

#### *Junior Members*

Allen, Woodward, Room 72, 89 State Street, Boston, Mass.

Consulting Chemist, Solvay Process Co.

Laurin, Eric T., 40 Lundberg Street, Lowell, Mass.

Instructor, Lowell Textile School.

### THIRD RESEARCH COMMITTEE MEETING

The third meeting of the Research Committee was held Friday, February 10, at 4 p. m., at the Engineers Club, Boston, Mass., the following members being present: Council, with the exception of E. C. Bertollet, and in addition William R. Moorhouse and W. J. Murray.

The reading of the minutes of the last meeting was called for, but the reading of same was omitted by unanimous consent.

A report was presented by a subcommittee appointed at last meeting to consider the necessary steps to be taken in formulating a proper procedure to be followed in designating fastness tests which can be considered as standard.

It was decided by the Committee that they would carefully consider the work already done by the "Second Open Conference of the Fastness Commission of the Section of Chemistry and Dyeing and the Textile Industry of the German Chemical Society," but at the same time would only hold to those sections of the report which are believed to be adapted to our needs, and make whatever alterations, revisions and additions as might be considered necessary.

It was decided that after a proper outline had been devised, considerable experimental work would have to be done before anything definite could actually be established as standard. It was felt that more time should be devoted to a further consideration of the subject, and the Subcommittee was continued until the next meeting. The Subcommittee suggested several schemes of procedure to be used in the testing of cotton material relative to fastness to washing, but it was decided not to publish them in the Proceedings until they could be presented in a more complete form, as provisional methods.

It was considered desirable, at this time, that committees should be appointed to establish fastness tests for use upon wool and also upon silk material, in order that no time should be lost in arriving at definite data in this regard.

William D. Livermore was chosen chairman of the Committee relative to the Fastness to Washing of Wool Materials, which was to include George D.

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Moran and W. K. Robbins, and was authorized to add other members if thought desirable.

W. M. Scott was chosen chairman of the Committee relative to the Fastness to Washing of Silk Material, which was to include E. F. L. Lotte and such additional members as were thought necessary to work in co-operation.

It was decided that when sufficient progress had been made by the various committees upon cotton, wool and silk, the results would be published as provisional methods, and that after a reasonable time had elapsed the records could be considered as official.

W. E. Hadley, Secretary.

### COLOR REACTIONS FOR THE IDENTIFICATION OF ANTHRACENE VAT DYES

By WALLACE J. MURRAY

*Contribution from the Laboratories of  
Arthur D. Little, Inc.*

In identifying the dyes used on dyed cotton fabrics it is often necessary to test for the dyes belonging to the anthracene vat class. There are no simple, satisfactory tests for the members of this class described in the books on dye identification. Therefore, we attempted to find a reaction which would serve for their identification, and yet be simple enough for routine work. We have found a reaction which seems to meet these conditions satisfactorily.

When anthraquinone is reduced in alkaline solution the deep red salt of anthraquinol is formed. On acidification the yellow anthraquinol itself precipitates.

Since the anthracene vat dyes are derivatives of anthraquinone, it was thought that similar color reactions would be obtained on acidifying their leuco compounds.

This was tried out on eight typical anthracene vat colors, and the expected color reactions were obtained. They are given in the list at foot of this page.

The method used in carrying out these tests was as follows: A small sample of dyed yarn or fabric was reduced in a dilute sodium hydroxide solution with sodium hydrosulphite, heating if necessary. The solution was poured off and the yarn rinsed once with

water. Great care must be taken to prevent reoxidation. The best method is to pour off the reducing solution, and squeeze the yarn in the bottom of the tube with a stirring rod. Then fill the tube with water, work the yarn with a rod, and pour off the water. It is best to use boiled water, cooled out of contact with the air, but this is not necessary. The reduced yarn is covered with water and acidified with hydrochloric acid, when the color change is observed. On adding caustic the color changes back.

These color reactions only take place satisfactorily when the dye is entirely in the form of the leuco compound; and this must be kept in mind in carrying out the tests.

An excess of hydrosulphite at the time of acidification interferes with the test and deposits free sulphur in the solution. Hence the need of rinsing. It would be difficult to remove this excess of hydrosulphite when working with the dyestuff in substance, hence it is preferable to apply this test to dyed fabrics rather than to the dyestuffs themselves. However, the reaction can be carried out on the solution of the leuco compound if desired.

### MEETING OF RHODE ISLAND SECTION

The second meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists was held in the rooms of the Providence Engineering Society on Friday evening, February 17.

Mr. Culver for the Nominating Committee reported the following nominations for officers:

For Chairman—William H. Cady.

For Secretary—Frederick C. Cushing.

For Treasurer—Pen Verity.

For Sectional Committee—John G. Masson,  
Walter S. Williams, Roscoe L. Chase, H. F. Schwarz.

These persons were unanimously elected.

Robert Spurr Weston, Consulting Engineer, of Boston, gave a highly interesting talk on "Water Purification for Textile Purposes," illustrated by lantern slides. A lively discussion followed, and the meeting closed with a vote of thanks for the speaker. An abstract of Mr. Weston's talk will be published in the next issue.

Name of Dye	Color of Dyed Fabric	—Color of Dyed Fabric After Reduction—	
		(Alkaline Solution)	(Acid Solution)
Ponsol Yellow .....	Yellow	Dark Blue	Olive-Green
Cibanone Yellow .....	Yellow	Brown	Yellow
Vat Yellow R.....	Yellow	Pale Grayish Brown	Yellow
Indanthrene Blue RS.....	Blue	Blue	Dark Purplish Blue
Indanthrene Blue GCD.....	Blue	Blue	Violet
Indanthrene Dark Blue BO.....	Blue	Dark Blue	Orange-Red
Ponsol Violet .....	Violet	Blue	Purple
Indanthrene Green B.....	Green	Blue	Red



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## OBITUARY

James L. Amsden, Chemist of the Rockland Finishing Co., Inc., Garnerville, N. Y., and one of the Charter Members of this Association, passed away on Saturday, February 11 at his late residence, 139 Hudson Avenue, Haverstraw, N. Y. He was ill but a few days, having contracted influenza, which developed into pneumonia. He is survived by a widow and two children, John, aged eight, and Hope, aged twelve years.

Mr. Amsden was born in Springfield, Mass., in 1878 and graduated from the Worcester Polytechnic Institute in 1900. He was a conscientious student and a man of wide experience in matters relating to textile chemistry and dyeing. His obvious qualifications led to his being elected a member of the first Council of the American Association of Textile Chemists and Colorists, and he had recently been assigned by that

body the position of chairman of a committee to formulate plans for the determination of standard methods for testing the fastness to washing of dyed cotton fabrics. The Association feels that in the death of Mr. Amsden it has suffered a very severe loss.

## NOTICE OF MEETINGS

The next meeting of the Council will be held Friday, March 10, at the Engineers Club, Boston, Mass., at 4 p. m.

A meeting of the Research Committee will be held at the same place at 4.30 p. m.

Special committees on research work will meet at 3 p. m.

Members wishing to bring any matters to the attention of these meetings will please communicate with either the President or the Secretary.

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 BIBLIOGRAPHY OF JOURNAL ARTICLES ON DYE FASTNESS COMPILED BY WALLACE J. MURRAY  
 (Concluded from last issue.)
 

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1916	Chem. Weekblad, 13-1176	J. Straub	Testing Fastness of Gray Military Fabrics to Light	C. A., 11, 540
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# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

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## THE DISTRIBUTION OF REPARATION COLORS

**A**FTER several weeks of silence following the claim that present or former German agents had influenced the U. S. Department of State to abrogate the agreement whereby the Textile Alliance was permitted to act as a central agency for the receipt and distribution of America's share of the reparation colors, a statement has at last been issued by that organization which clears up any misunderstanding as to what was in the mind of Albert M. Patterson, president, when he made his charges.

Before going any further, it may be as well to point out the fact that the Textile Alliance would do better to be still more frank and open. When its charges first appeared, The REPORTER contended that they called for concrete, substantiating evidence—which was conspicuous by its total absence at that time. The charges were apparently extremely serious, and if Mr. Patterson was not prepared to back them up, then he was bound to keep them out of the press, no matter how well grounded they were, until ready to do so in conclusive fashion. The view was held that the matter was public property, and that the people of the United States had a perfect right to demand the facts even if it became necessary to air them in the courts. In other words, the public should not be obliged to drag forth any evidence which might be available. It should appear spontaneously for the reason that the charges were not made reluctantly, as by one who had inadvertently allowed them to "leak out," but boldly and without the inducement of a strong outside demand. Yet after the charges were made there ensued a complete silence, and any attempts to elicit further information met with refusal.

The Alliance now says, in the statement which appears in full elsewhere in this issue:

"In October, 1919, and several times since, the Textile Alliance, Inc., without solicitation on its part, was re-

quested by the Department of State to undertake—and it did undertake—the purchase and distribution of reparation dyes accruing to the United States.

"In October, 1921, a protest was filed with the Department of State against this arrangement by Messrs. Kuttroff, Pickhardt & Co., Inc., a New York corporation, owned and managed by American citizens of German birth, who formerly in their corporate or private capacities were agents of the Badische Anilin & Soda-Fabrik, one of the constituent members of the German dyestuff monopoly."

From which it appears, then, that the firm in question is presumably the "present or former agents of certain of the German manufacturers constituting the Interessen Gemeinschaft" whose "pressure" upon the U. S. Department of State caused that body to terminate its agreement with the Textile Alliance—the "present or former agents" mentioned by Mr. Patterson in his letter. And it is not with any unfriendly intention toward the Alliance, which has earned the thanks of American dye consumers by its capable performance of an important service, that we take occasion to point out that this supplementary statement is somewhat unsatisfactory as regards necessary detail. Like the former, it appears to say either too much or too little. Those concerned, as well as the public, will surely want to know upon what grounds Kuttroff, Pickhardt & Co. based their protest against the good offices of the Alliance in the purchase and distribution—on a non-profit basis—of reparation colors. More particularly will the public itself want to know what pressure, if any, was exerted upon the State Department by Kuttroff, Pickhardt & Co. in order to bring about the abrogation of the agreement. This last is the important issue, for, as previously stated by the Department, "there was no dissatisfaction with the work of the Alliance."

As a matter of fact, there is nothing particularly sensational in the whole affair, and that is why it would have been better for the Alliance to have said its say in full at the very beginning. To the public—hundreds of whom read the statement in the press—it would, however, shape up about like this: The Department of State cancels its agreement, declaring that there is no dissatisfaction with the Alliance and that it merely desires to be relieved of further financial responsibility in connection with the importation of reparation colors. So far, so good. Then the Alliance issues a statement, which is publicly printed, to the effect that the governmental decision was the result of pressure by present or former German agents. Without the balance of the story, that sounds serious enough to warrant at the very least a Congressional investigation—and that is why there should have been more detail given at the outset. Or at all events, so it seems to many.

There was probably no "pressure" of any kind brought to bear, or even "influence." To declare that German agents could exert pressure enough to make Uncle Sam yield a point against one of his own industries is rather more of a strain than the average credulity can stand. Such a declaration was distinctly unfortunate, but it is



now past, and therefore may as well be forgotten.

Meanwhile, the Alliance avers that the State Department issued letters to Kuttroff, Pickhardt & Co., "and to other representatives of the German dye monopoly," informing them that the Department has no objection to the Reparations Commission allocating reparation colors to them. And it further believes that "if the allocations be divided among profit seeking corporations, connected or formerly connected with the German monopoly, the effect will inevitably be to re-establish the control, not only of reparation dyes, but of all German dyes, in the hands of the German monopoly or those representing it."

In the light of all these various revelations and contentions, it would appear as though several changes might be made in the manner of handling reparation colors. But these changes need not necessarily be radical ones. The statements herein recorded, and others which were previously printed in the form of resolutions, show that there is a wide-spread demand among dye consumers to have the Alliance continue to handle the reparations imports, and to this the State Department has no objection whatever. On the other hand, distribution of these colors by the Alliance may logically be objected to by other importers and dye agents on the ground that it brings a non-profit organization directly into competition with legitimate business, and further that it results in the creation of an efficient distributing organization which might conceivably be acquired, intact, by some individual firm among them at some future time. In other words, the dye dealers rightly insist upon their privilege to carry on their business of selling without being obliged to compete with what was virtually the Government.

It has always been the contention of *The Reporter*, in connection with all dye protection problems, that in cases of this kind there is invariably a way out which need injure neither side. And so it is in the present instance. The Alliance calls attention to the fact that the Reparations Commission is holding up America's share pending the designation by the Department of State of some central receiving body, and that if this continues the United States may be deprived of a portion of its just due. The Alliance does not seek to continue this work, and would prefer to see it in charge of some Government body; but since there appears to be no Government body willing or financially able to undertake it, then let the State Department notify the Reparations Commission that it may continue to consign the United States colors to the Alliance as heretofore. The nature of the business demands a central receiving organization, but let its functions stop right there, and all further responsibility as a distributor cease. Distribution could then be effected through the various agents already designated by the State Department, and such other reputable firms which it may see fit to designate. These can purchase of the Alliance at cost, and thereafter all competition will be on an equitable basis. A non-profit organization will receive the colors, but the unjust competition of such an organization will be removed from the distributing field.

And if the Textile Alliance is to continue as the sole

authorized importing body for Reparation colors—as seems wisest to us—there is one change in the activities of this organization which ought to be effected immediately. This is the entire segregation of the Textile Alliance and the Dye Advisory Committee—the body which licenses dye importations. Consumers as a whole feel that the Dye Advisory Committee should act solely in a judicial capacity and should have no slightest connection with any organization which actually handles dyestuffs. A complete segregation of these two quasi-governmental bodies would go far towards restoring approval of our dye-licensing and reparation-importing machinery in the eyes of dyestuff consumers.

This would appear to be the best way out of the present situation, which, as the Alliance rightly maintains, calls for speedy action of some sort. Manifestly, if any and all dye dealers, reputable or otherwise, were allowed to make separate contracts with the Reparations Commission, there would be no sure and easy way of checking up on importations, and further, it is believed by many that we should shortly have a return of the conditions which prevailed in the early years of the war, when the dye "gyp" was rampant and adulterations and a multitude of other irregularities were so prevalent as almost to destroy the last vestige of confidence possessed by American dye consumers. Such a chaos is not desired again, and the present scheme offers advantages which would prevent it while satisfying all parties having to do with reparation colors.

#### AN ILL-TIMED DEMAND

HAVING progressed from comparative quiet and an entire absence of rowdiness, the New England textile strike, involving some 45,000 workers, which began two weeks ago, had attained, at the present writing, the apparently inevitable stages involving stonings, shootings, the calling out of troops and the employment of riot guns in an effort to quell disturbances. Violence, always foolish and ineffectual in proceedings of this kind, has gained the ascendancy, serving still further to alienate public sympathy with the demands of the strikers.

For although many undeniably just strikes, designed to do away with real abuses or to relieve intolerable working conditions, have been staged in the past, the real issue of the present outbreak as revealed by a geographical survey of its centers is far from such. Rhode Island and New Hampshire are affected, whereas in Massachusetts the only city touched was Lowell, where 2,600 employees of the Hamilton Mills and the Bay State Cotton Corporation went out on the first day. The former mill closed down, but the latter resumed operations with enough men to justify remaining open.

Workers in all three States received a twenty per cent cut in wages. In Massachusetts the cut was actually a full twenty per cent, whereas in New Hampshire and Rhode Island it would in reality have

amounted to about ten per cent because of the accompanying increase from the forty-eight-hour to the fifty-four-hour week. Yet it was in New Hampshire and Rhode Island that the workers struck, while those in Massachusetts accepted their twenty per cent cut and stayed on the job.

Shortly before the strike occurred, Massachusetts passed a forty-eight-hour law, thereby making it impossible for employers to mitigate the wage cut as was the case in neighboring States. The real point at issue, then, is not money, but time spent at work.

In Somerworth, for instance, one of the principal storm centers of New Hampshire, there were 150,000 yards of cloth lying partly finished in the vats of the Great Falls Bleachery on the opening day of the strike. During a conference between Superintendent Hayes of the bleachery and Horace A. Riviere, of the United Textile Workers of America, the latter stated that men would be sent in to complete the cloth-finishing process provided they were allowed to do so on the forty-eight-hour schedule and at the old wage rate. The mill man rejoined that employees would not be allowed to enter the mill for this purpose upon such terms, since there were enough men in the executive departments to put the cloth through.

Other instances might be cited, but this serves as well as any to show that what the men were chiefly interested in was in getting more leisure rather than more money.

Undoubtedly the workers have chosen a bad time to take a stand of this sort. The demand of the steel men for the elimination of the twelve-hour shift, with periodic twenty-four-hour shifts when changing from night to day, is vastly different, since this has been proved to be positively detrimental to the health and efficiency of the worker. But no question of breaking down under prolonged toil enters into the textile situation. Moreover, this country is still busily engaged in recovering from the effects of a wasteful war, and the trend of thought in all quarters is toward increased production as among the means for accomplishing this.

It is an old law, but a true one, that a worker can buy with his day's wages only what some other worker produces in a day, and sooner or later, when labor tries to get something for nothing, it sees this economic principle demonstrated afresh. It is entirely safe to say that any executive in the textile industry puts in an average of at least nine hours a day or better, and there need be no cry of an unjust distribution of the burden in the present case. If for no other reason than that the country as a whole needs his products, a man surely ought not to object to adding an hour a day to his eight-hour schedule, particularly when he can earn more money by doing so.

#### AMUSING, PERHAPS, BUT NOT IMPORTANT

OF more than passing interest to Americans is the recent conviction at Ludwigshafen, Germany, of Dr. Paul Kappelmeier, a dye chemist in the employ of

the Hoechst Farbwerke, on a charge of selling manufacturing secrets to the Du Ponts. Kappelmeier was fined 50,000 marks and sentenced to nine months' imprisonment, while Dr. Albert Sander, indicted on a similar charge, was acquitted.

Just what value was placed by the Hoechst works upon the trade secrets thus disclosed is not made clear by reports reaching this side of the water. But it is fairly evident that they were considered important, judging from the amount of the fine and the length of the sentence. Also, whatever immediate harm such disclosures can do to the German dye industry as a whole, since its ability to market products here is strictly limited and it is able to undersell American manufacturers in foreign markets, is bound to be problematical for some time to come. It is somewhat doubtful whether the actual damage suffered will be great, owing to the inherent power of the organization of which the Hoechst concern is a member. The sentiments and motives actuating the prosecution and disposal of the Kappelmeier case appear rather to have been based upon principle, and to indicate, therefore, that the Cartel has by no means abandoned hope that it will some day again control American dye markets. Indeed, the very phrase coined by the Germans to describe that class of offense, namely, "economic treason," shows how seriously they continue to regard their chances of regaining former dominance.

It was charged by the prosecution at the trial of the two men that a Dr. Kunze, of Zurich, had acted as intermediary between Kappelmeier and the Du Ponts for the transfer of information which the former was in a position to obtain as director of research for the Hoechst company. It was stated that he sent to the United States a complete list of the composition of all dyes manufactured by his own plant, and that while he was negotiating with Kunze he was also in touch with another American dye factory with a view of obtaining a position with it.

It is difficult to express in cold type some of the subtler mental reactions induced by affairs such as the present one and the importation of German dye chemists for service in American plants—reactions experienced by many in the trade which are wholly apart and aside from the morals or ethics involved. Denounce the latter, if you will, and condemn the practice on principle; nevertheless it is undeniable by all save a few fungi that these cases, when viewed in another light, produce a certain feeling of amusement. We have been so overwhelmingly impressed by the utter impregnability of the Cartel—an impregnability supposedly based upon something beyond mere financial returns or even lifelong training—a something which was believed to extend clear down into the heart of Germany's national pride and which was deemed stronger almost than love of life itself—that it is difficult to repress a smile when one of its own henchmen tries to "sell out," thereby demonstrating anew the old saying about rats leaving a sinking ship. It is the



always-potent contrast of the sublime and the ridiculous which begets this smile. Likewise it reveals that the mighty god of Mammon can still find plenty of devotees among the professed scornful when hard times become his allies. Most of all does it show once more, and in striking fashion, that the Germans are just as far from being supermen, scientifically, morally or in any other way, as are the rest of us, who never made any pretensions of this kind. The spectacle of one of these "supermen" being arrested and brought back to Coblenz for trying to accept a position with an American firm, and of another flying pell-mell across the Holland border into Belgium with German and Dutch secret-service men in full cry behind him, is something well calculated to upset the gravity of ordinary mortals. When it is placed side by side with some of the propaganda which was rife here before and during the early years of the war, we are disposed to believe that readers will agree with us that it is, in plain English, funny, and, further, that it is little more.

Do not, we would urge some who are given to viewing molehills as mountains, attach undue significance to the Kappelmeier conviction. Its importance can scarcely be *underestimated*. When American dye manufacturers first began hiring German chemists to come over here and help shorten manufacturing processes and to save unnecessary research work, there was something of an outcry in certain quarters. American housewives would be "humiliated," the trade was assured, if they were obliged to wear apparel sullied by contact with the producers of poison gas. Yet the importation of reparation and other colors coming direct from the very factories and, perhaps, the very machinery which once turned out these late examples of *schecklichkeit*, went steadily on—as it properly should in cases where American manufacturers could not supply the needed products—and American housewives have suffered both proceedings without protesting. It will be readily enough conceded that conditions would be far nearer the ideal if we could manage to get along without either German colors or chemists, and thus become truly self-contained as regards coal-tar chemicals in general; but we formerly held and still hold it to be inconsistent to connive at the importation of German dyestuffs while condemning the importation of German dye makers. Any stigma which attaches to one must inevitably fall upon the other, and since the time has not yet come to make a clean sweep, why not, then, take advantage of every opportunity to shorten the interim? The importation of German colors advances the American industry not at all along the road to greater independence, whereas the presence here of German technical men does.

The REPORTER had no part in the former outcry, nor does it believe the present case worthy of much attention. It may be adjudged immoral to corrupt German technical men with American gold, but at all events it is certainly no worse than the corruption of American dyers by Germany which was allowed to continue for years without a murmur. Persistently denied a chance to work out their

own salvation by the normal route, American dye makers cannot be severely censured if they are disposed to fight the devil with fire, and if any party to such transactions chances to run afoul of the law on either side of the water, that is distinctly his own affair and his own loss. We do not believe that the present instance need be "viewed with alarm" nor magnified into any greater importance than a calm consideration of the facts would indicate.

## THE CHEMICAL CONSTITUENTS OF RAW COTTON

(Continued from page 156.)

flocculated by the addition of salts. More prolonged action of alkali leads to *metapectic acid*, the ultimate product of the action of the usual bleaching agents. Pectic substances are almost entirely removed from the fiber in the scouring operations, which probably affect (40) the decomposition of metallic salts. In a recent process, it is proposed to eliminate pectic matter by the use of hot hydrochloric acid; it is claimed that the fiber is not seriously weakened by the treatment.

Methods for the extraction of pectin substances from plants have been elaborated by Bourquelot and Herissey (41), Wilhelmi (42), Schryver and Haynes (43), van der Linden (44), Hunt (45), and Caldwell (46), and means for their estimation by Fellenberg (47) and Koydl and Stros (48). The constitution of pectin has received attention from Weisberg (49), F. Ehrlich (50), pectin of the cell-membranes of plants is the calcium- and Gartner (51). Ehrlich's work indicates that the magnesium salt of a complex anhydro-arabino-galactose-methoxy-tetragalacturonic acid. There is no evidence as to the mode of linking, save that the arabinose group is weakly and the galactose group strongly held. Gartner considers that pectic acid is a galactose-galacturonic acid, rather than a tetragalacturonic acid.

## IX. COLORING MATTERS

Little is known of the substances occasioning the color of the cotton hair. Penot (1) observed that the coloring matter is soluble in alkalis, but not immediately, air and light, or chlorine, being necessary for its complete removal. Schunck (4) and Knecht (24) have isolated highly-colored products containing nitrogen to which they are inclined to ascribe the color, but the conditions under which they were obtained—by soda-ash and caustic soda boils respectively—together with the analyses recorded by Schunck, render it probable that they are decomposed proteins. Still, it is possible that the coloring matter may occur in combination with protein. Taylor (52) has noted that the coloring matter present in cotton is eliminated completely by the use of a hypochlorite, together with hypochlorous acid or chlorine, but not by chlorine, hypochlorous acid, or a hypochlorite alone, and has drawn the conclusion that two coloring matters are present.

The pigment of cotton is most pronounced in wild varieties, the hairs of which are more or less colored by a reddish endochrome, especially in the parts more exposed to light. The color deepens as the cotton ripens, and W. L. Balls (53) states that a profound change occurs at about the 27th day of the development of the boll. The young bolls "pickle" in a mixture of alcohol and acetic acid to a green color, but the older bolls give a pink or bright red "pickle," and later, when the fruit is beginning to burst, the "pickle" is brown. The color is increased by exposure to diffused light, but is often destroyed by sunlight, especially when the protoplasm is dead. It is also deepened by steaming (54).

In a recent communication (55), Brabham states that cottons varying in color from light green to dark brown have been cultivated. The fibers are extremely fine, and the brown variety is stated to surpass in fineness any cotton hitherto produced.

The pigment is found chiefly in the lumen, but is also in association with the cellulose. Brazilian and South American cottons contain very little, but Egyptian cotton is so much richer in pigment that it can be readily distinguished thereby.

It is not known whether the pigment bears any relation to the "gossypol" of cotton seed (56) or to the glucosides found by A. G. Perkin (57) in cotton flowers.

#### X. CELLULOSE

The scope of this report includes only analytical procedure with regard to cellulose and its modifications. An excellent review of the subject has been made by J. F. Briggs (58), in which it is pointed out that many of the older methods, especially those of agricultural chemistry, merely indicate the proportion of ultimate fiber in the material examined, whereas a process is required which will isolate the realizable cellulose, reasonably unimpaired. That is, substances like lignin must be removed without altering the cellulose. For this purpose, Cross and Bevan's process receives the greatest measure of support, the lignin being destroyed by the action of chlorine. Waxes and other extractives may be removed either by means of sodium hydroxide or by extraction with benzene and alcohol. In a recent modification of Cross and Bevan's method (59) the material, after extraction, is treated alternately with chlorine and sodium sulphite.

In the case of highly lignified material, the alternative process of dissolving the cellulose and leaving the lignin may be employed. Digestion with fuming hydrochloric acid is recommended by Willstaetter and Zechmeister (60).

Cellulose undergoes change very readily, the chief modifications being (a) hydration, now regarded as an absorption phenomenon of the colloid cellulose, (b) oxidation, (c) acid hydrolysis, and (d) "depolymerization." The first modification is roughly estimated by means of the absorptive power of the material, under empirical conditions, for iodine (61), substantive dyes (62), cupric hydroxide from Fehling's solution (63), or sodium hy-

droxide (64). Another approximate method for ascertaining the extent to which cellulose is "modified" is to determine its solubility in sodium hydroxide, Schwalbe (65) using a 5 per cent and Jentgen (66) a 17.5 per cent solution. The process is employed mainly in distinguishing various types of artificial silks. The most important clues to "modification" are afforded, however, by determining (a) the "copper number" (67), that is, the number of grams of copper reduced from Fehling's solution by 100 grams of the cellulose, the value being below 1 for purest bleached cotton and rising to as much as 16 in the case of oxidized cellulose, and (b) the viscosity in ammoniacal cupric hydroxide solutions. The latter method has been investigated very thoroughly in the Research Department, Woolwich Arsenal (68), where it has proved successful, after recognizing that bright light and air must be excluded from the solution, that the cuprammonium solution must be fairly constant, and that the "falling sphere" viscometer is the most convenient measuring instrument. It is found that cotton treated with alkali hydroxides gives much less viscous solutions in "cuprammonium" than untreated cotton, and that the viscosity of nitrated cottons (in mixtures of alcohol and ether) varies according to the viscosity of solutions of the original cotton. Nitrated raw cotton gives the most viscous solutions, which fact suggests that the action of sodium hydroxide may be of the nature of "depolymerization."

In connection with the estimation of cellulose, the "drying to constant weight" is important. Most authorities agree that "dry" cellulose is obtained by heating to constant weight at 105 deg. Cent., and 105 to 110 deg. Cent. is the temperature employed in most of the Continental conditioning houses, although the Testing House of the Manchester Chamber of Commerce uses 100 deg. Cent. Briggs (58) suggests, as an alternative, drying in a vacuum over phosphoric anhydride, and drying over sulphuric acid under similar conditions has also been employed. Schwalbe (69) proposed the determination of "water of hydration," as distinct from "hygroscopic water" by distillation with toluene, the difference between the toluene method and the normal "drying" giving the "water hydration." Later, however, (70) he found that the toluene method only estimated "hygroscopic" moisture. The question of the accurate determination of moisture has also been considered by Schmansky (71) and by Nelson and Hulett (72). The latter observers heat the cotton in a very high vacuum and condense the moisture in a receiver cooled with solid carbon dioxide. They have adapted the method to the determination of the temperature at which decomposition sets in and the rate of decomposition. The relations between cotton and water will, however, form the subject of a special review.

The practice of washing with alcohol before drying seems to be objectionable, for both Renker (73) and Briggs (58) report that cellulose obstinately retains alcohol which cannot be removed by heat.

Any attempt to review the properties of cellulose would at once open one of the largest chapters in organic and



applied chemistry, but reference may be made, in conclusion, to an excellent summary of the reactions of cellulose and their application in the establishment of its chemical constitution recently published by H. Hibbert (74).

#### XI. BEHAVIOR OF THE MINOR CONSTITUENTS OF RAW COTTON IN TECHNICAL OPERATIONS

The literature of cotton spinning, manufacturing, and finishing contains an enormous number of references to the behavior of the ash, wax, protein, and pigments of raw cotton in these technical operations. The following notes may be regarded as typical of the information which is obtainable from such sources:

##### *A—Spinning*

*Effect of the Wax in Spinning*—It is generally agreed that at the customary temperature of the spinning mill the waxes in the fiber become soft and semi-liquid, and thus allow the proper working of the cotton. After spinning, the oil sets and cements the fibers. Spinning trials of Egyptian cotton deprived of its wax (22) showed that the material behaves very badly in the drawing and spinning processes, giving an excessive amount of waste, irregular results, and showing a tendency to adhere to the rollers. Finer counts give great trouble, and breakages are extremely frequent. In the loom, as warp, it is equally troublesome. Extraction with benzene after spinning, however, increases the strength, but diminishes the elongation of the yarn, as shown in the following table:

	American %	Egyptian %
Increase in strength .....	12.4	11.0
Decrease in elongation .....	4.0	9.9
Average counts before .....	56.8	58.1
Average counts after .....	58.2	58.9

The strength tests are the average of 100 measurements.

The addition of 2 per cent of paraffin wax to the extracted yarn decreases its tensile strength by 33 per cent. Yarn spun from extracted cotton is from 24.5 to 27 per cent weaker than that from normal cotton.

##### *B—Scouring and Bleaching*

*Losses During Bleaching*—It is usually stated that cotton yarn loses from 5 to 7 per cent of its weight during bleaching, the figure for cloth being larger by the amount of material added during sizing. Jecusco (75), for example, states that American cotton yarn on boiling with 3 per cent caustic soda and 2 per cent sulphated oil at 15 pounds for 8 hours loses 6.45 per cent, the loss increasing to 7.3 per cent on full bleaching. Using soda-ash instead of caustic soda and following with a stronger

hypochlorite solution, the loss in weight was 7.1 per cent. Trotman and Pentecost (76) point out the necessity of considering the moisture present before and after bleaching in working out figures of this kind. In a number of carefully conducted laboratory experiments, the following figures were obtained for the loss during the soda boil:

Reputed Count	Loss %	Number of Tests
24/2 American	5.30	7
32/2 American	4.01	36
40/2 American	4.35	15
70/2 American	3.90	29
70/2 Egyptian	6.54	8
80/2 Egyptian	4.59	12
100/2 Egyptian	4.35	18
120/2 Egyptian	4.60	12
150/2 Egyptian	4.55	6

The comparative effect of a number of reagents on the same cotton under standard conditions were found by Trotman and Pentecost to be as follows:

Reagent	Loss %
Potassium hydroxide .....	5.00
Sodium hydroxide .....	4.40
Sodium carbonate .....	3.70
Sodium borate .....	2.80
Sodium silicate .....	2.40

*Removal of Mineral Matter During Bleaching*—The mineral matter is speedily, but not completely, eliminated during the usual bleaching operations, the total loss at each stage being given by Hebden (77) as follows:

Steep %	1st Boil %	2nd Boil %	Chemic %	Sour %
70.5	87.3	95.4	93.0	95.0

Knecht (24) reports that after lime boil, sour, soda boil, sour, chemic and sour HCl, the ash of a soft twist Egyptian sample had decreased from 0.89 to 0.15 per cent.

*Removal of the Wax in Bleaching*—The removal of the wax is one of the principal objects of the lime and soda boils, and their relative efficiency has been largely debated. It appears to be generally conceded that, as a single operation, the soda boil has the greater effect, as indicated, for example, by the following table (78), the figures being the percentages of ash, etc., left in the fiber:

	Expt. I		Expt. II		Expt. III	
	Soda Boil	Lime Boil	Soda Boil	Lime Boil	Soda Boil	Lime Boil
Ash .....	0.26	0.52	0.26	0.50	0.42	0.56
Free fat . . .	0.10	0.26	0.20	0.15	0.16	0.11
Fatty acids						
(as soap) . .	0.16	0.22	0.13	0.21	0.26	0.56
Nitrogen . . .	0.05	0.07	...	...	0.07	0.07

It is when the lime boil is considered in relation to the lime-sour-soda-sour sequence that opinions differ. Both Higgins (79) and Trotman and Pentecost (76) agree that in the lime boil the saponifiable portion of the wax is hydrolyzed and that the subsequent souring converts the insoluble soaps left on the fiber into free acids, which remain in close contact with the unsaponifiable matter, so that in the lye boil a soap is produced and rapid emulsification and elimination of the unsaponifiable matter result. The latter authors consider, however, that this result is achieved equally well by the direct soda boil.

The suggested mechanism of the lime boil is supported

ical damage due to the deposit of silica on the fiber. Other suggestions for the more effective removal of waxes include the use of (a) a soap solution containing benzene (83), (b) a mixture of potash soap, carbon disulphide and olein (84), (c) resin soaps, (d) benzene and other solvents brought into emulsion with Turkey-red oil, and (e) Turkey-red oil and oleic acid (85).

Knecht (23) considers it improbable that cotton wax is saponified under normal bleaching conditions, the wax being only partially removed, and then by emulsification. He quotes the following figures in support of the statement:

Scouring Agent	Time	Wax Removed
		%
Soda ash, 4 deg. Tw. ....	4 hrs.	30
Sodium hydroxide, 2 deg. Tw. ....	4 hrs.	28
NaOH, 2 deg. plus Marseilles soap (5 per cent of weight of cotton) ....	25 mins.	45
NaOH, 2 deg. plus Marseilles soap (5 per cent of weight of cotton) ....	4 hrs.	64
NaOH, 2 deg. Tw. plus resin soap (5 per cent of weight of cotton) ....	25 mins.	73

by the experiments of S. A. Shorter (80) and of Scheurer and Wallach (81) on the emulsification of mixtures of saponifiable and unsaponifiable oils. Higgins (82) quotes the following figures, obtained in the treatment of banks of linen yarn:

Treatment	Decrease Weight %	Wax Remaining %
Lime, lye, lye .....	21.8	0.060
Lye, lime, lye .....		0.046
Lye, lye, lye .....		0.160

Hebden (77) indicates that the removal of fats and waxes soluble in ether during the soda boil takes place as follows:

Steep %	1st Boil %	2nd Boil %	Chemic %	Sour %
5.5	20.4	64.0	67.8	69.6

Trotman and Pentecost (76) give the following typical analyses to indicate the difference between good and bad soda boils of cotton goods:

	After Good Boil %	After Bad Boil %
Mineral matter .....	0.05-0.75	1.00
Free fat .....	0.10-0.15	0.35-0.70
Fat as soap .....	trace	0.25-0.50
Nitrogen .....	0.05-0.10	0.25-0.35

They emphasise the utility of sodium carbonate and of borax as emulsifying agents, but consider that the scouring effect of sodium silicate is offset by possible mechan-

Although the use of resin soap appears to be so effective, it has been suggested that if the water used contains lime or magnesia, resinates may be precipitated on the fiber and eventually produce a brown color (86). The efficacy of potassium hydroxide compared with sodium hydroxide (76) and of strontia in relation to lime (87) has been considered. Potassium hydroxide is said to remove 20 per cent more wax when used in equimolecular proportion for the same time, whilst strontia is supposed to exert a saponifying action three times as great as that of lime and to give a superior general bleaching effect. There is, however, the possibility of tendering, due to oxidation.

The retarding effect of neutral salts and of hard water on the soda "boil" is considered by Trotman in a later communication (88). The same writer (89) points out that wax retained after boiling may protect the cotton from the action of the "chemic," whilst Graf (90) considers that the reducing agents present in the wax cause the "bleeding" of vat colors in the lye boil, and indicates methods of overcoming this. Kollman (91) has studied the fall in reducing power of raw cotton in the course of the bleaching process, the greatest change taking place after the lye "boil," when the majority of the secondary constituents are removed. Whether the "yellowing" of goods in storage is due in some measure to the wax appears to be undecided, Levine (37), Crowther (92), and Higgins (93) favoring this assumption, whereas Erban (94), Hebden and Freiburger (95) are of the contrary opinion.

In bleaching, cotton from which the wax has been previously removed yields a "white" much superior to the untreated cotton (23).

In all the more recent literature (78-95), an important series of experiments by A. Scheurer (96) appears to have been overlooked. Scheurer studied the saponifi-



cation of tallow, cottonseed oil, and the fatty constituents of raw cotton in contact with cotton cloth, and came to the following conclusions (1) Sodium hydroxide is twice as effective as sodium carbonate in equivalent concentration: increasing the concentration of alkali from 5 to 10 parts per 1,000 is without sensible effect; (2) mixtures of sodium hydroxide and sodium carbonate show maximum efficiency when the proportion of carbonate is equivalent to 25 per cent of the total alkali, an effect which is ascribed to the mechanical properties of the solution; (3) the addition of rosin increases the velocity of saponification, which is still further enhanced by increasing the concentration of the alkali; (4) the saponification of cottonseed oil in contact with the fabric is relatively rapid, and appears to increase the rate of saponification of the natural fatty constituents of the raw cotton; (5) neutral fats (triglycerides) are much more rapidly attacked by alkaline solutions when mixed with readily saponifiable oils, owing probably to emulsification; (6) whilst the rapidity of the action of lime is noteworthy, the complete removal of the fatty matter can only be effected by a subsequent acidification and boiling with sodium carbonate; (7) the general statement is made that complete saponification of the fatty constituents of cotton may be effected (*a*) by a single treatment with sodium hydroxide and rosin, or (*b*) by the lime—"sour"—soda-ash sequence, the latter process having the greater elasticity and certainty.

*Effect of the Removal of the Wax on the "Wetting" Properties of Cotton*—Beadle and Stevens (97) pressed various samples of air-dried cotton into loose wads,  $15 \times 10$  mm., weighing 0.1 gram each, and let them fall from a certain height onto the surface of a column of water. The time taken to pass through the surface was used as a measure of the "wetting" property of the cotton. The following results were obtained:

Cotton, raw .....	More than 24 hours
Cotton, bleached but not scoured...	31.3 seconds
Cotton, boiled in 1 per cent NaOH...	12.3 seconds
Cotton, boiled in 2 per cent NaOH...	5.7 seconds
Cotton, boiled, bleached and boiled again .....	4.0 seconds
Cotton, extracted with ether and alcohol .....	0.5 seconds

The maximum effect of the caustic soda treatment was produced by boiling for three hours.

*Removal of Nitrogenous Matter*—The effect of bleaching operations on the nitrogenous constituents has been examined by Schindler (37), Knecht (24), and Higgins (98). Schindler was mainly concerned with the action of sodium hydroxide solutions of increasing concentration, and found that after boiling with sodium hydroxide of 2 deg. Tw. for eight hours the nitrogen content of an Egyptian cotton was reduced from 0.250 to 0.065 per cent. Increase of the concentration of sodium hydroxide to 10 deg. Tw. reduced the nitrogen to 0.028 per cent, whilst further treatment with bleaching powder of 1.5

deg. Tw. reduced it to 0.003 per cent. Using a still stronger solution of sodium hydroxide (77 deg. Tw.), the percentage of nitrogen was reduced to 0.016–0.019. Most of the nitrogen expelled from the cotton remained in some form in the solution, and was not isolated as ammonia. The figures obtained by Higgins (98) for the elimination of nitrogen as ammonia by the method of Osborne, Leavenworth, and Brautlecht confirm this, an American yarn yielding only 0.018 per cent and an Egyptian 0.034 per cent of nitrogen as ammonia.

Knecht (24) gives the following figures for the various stages of the bleaching process, the nitrogen being expressed in terms of that originally present:

After—	Originally Present Percentag of N Which Survives Treatment
Lime boil .....	54.0
Sour, HCl .....	40.5
Caustic soda boil .....	27.1
Sour HCl .....	16.8
Chemic .....	6.7
Sour, HCl .....	5.8

The first three extracts were examined. The first contained 3.7 per cent of nitrogen, but did not give a protein reaction. Treatment with alcohol precipitated a gelatinous substance resembling Schunck's pectic acid. The second yielded stearic acid and a small proportion of cotton wax, and the third, which contained 3.46 per cent of nitrogen, appeared to consist mainly of brown coloring matter.

Higgins found that unsized yarn loses about one-third of its protein on stepping in salt solution, and formed the opinion that the usual process of scouring with caustic soda or by the lime—sour—soda-ash sequence removes all the protein. The treatment leaves about 8 per cent of the nitrogen unaccounted for, and it is suggested that this residuum must be non-protein nitrogen, since Hebden (77) found that the first boil effected the removal of all the phosphorus but only 91.5 per cent of the nitrogen. The total loss of nitrogen after different bleaching processes is given as follows:

First boil, 91.5 per cent; second boil, 91.7 per cent; chemic, 92.2 per cent; sour, 92.7 per cent.

The importance of the complete removal of the nitrogenous substances in cotton is emphasized by Trotman (99), who has found that nearly all cases of bacterial damage to finished goods are associated with high nitrogen content.

#### *C—Destruction of Secondary Constituents by Fermentation*

For many years, malt extract has been employed to assist in the removal of starch from sized fabrics, but attention has recently been directed to the application of enzymes as a substitute for the alkali "boil." It was shown nearly thirty years ago by Herbert (100) that bac-

teria which destroy cellulose do not attack the cellulose molecule proper until adherent pectins, gums, and tannins have been decomposed. Recently, Levine (101) has examined the action of *B. amylolyticus*, *B. fimi*, *B. bibulus*, *B. carotovorus*, and *B. subtilis* (Ehrenberg) on unbleached cotton in a nutrient medium containing dipotassium hydrogen phosphate, magnesium sulphate, sodium chloride, ammonium sulphate, and lime. He found that the nitrogenous substances and constituents which are soluble in ether are efficiently removed, but that the impurities soluble in alcohol are only attacked by *B. carotovorus* and *B. subtilis*. In the case of *B. bibulus* and *B. fimi*, the cloth became weaker, which may have been due to the action of air on parts incompletely submerged. On the large scale, the material was incubated with the bacterial culture for periods ranging from 24 to 72 hours, with encouraging results. Finally, Rohm (102) has protected the substitution of the alkali "boil" by a "steep" in a 0.1 per cent solution of pancreatin at 20 to 40 deg. Cent. for some hours, other enzymes such as papayotin or ricinus ferments serving to the same end.

### D—Dyeing

*Influence of Minor Constituents*—Schwalbe (19) showed that substantive dyes gave lighter shades on extracted cotton, whereas methylene blue and some other dyes gave darker shades. Rona and Michaelis (103) go so far as to affirm that the apparent absorptive power of cotton for dyes is really due to an exchange of mineral matter for dye, and support this view by the fact that in the absorption of methylene blue the chlorine content and the hydrogen-ion concentration of the solution remain constant.

### E—Beetling

*Influence of Wax*—It is almost impossible to obtain the effect of the beetle finish if wax is left in the cotton. Even the trace of wax left after scouring and bleaching may be sufficient to create this difficulty, and the use of unsaponifiable material in sizing the warp yarn would, of course, aggravate the trouble. For this reason, extraction with suitable solvents is strongly recommended by Fort (104), and a process has been patented which can be applied before or after bleaching, or after dyeing, and even while the fabric is wet (105).

### F—Steaming

Cotton becomes yellow when exposed to steam, and it has actually been proposed to impart to white cotton the appearance of Egyptian varieties by steaming under 1 to 1.5 atmospheres pressure for 25 to 50 seconds (106). The yellowing is not due to the fatty constituents of the cotton, and, in fact, F. Erban has found that the phenomenon is intensified if the fat has been extracted (107). The "gums" in the cotton may contribute to the process, but, on the whole, fully scoured cotton is as liable to be

come yellow as raw cotton. The subject has been studied by Freiburger (108), who came to the following conclusions: (a) Bleached fabrics show the strongest discoloration, those bleached in the cold being more susceptible than fabrics bleached in the warm; (b) fabrics bleached in the warm with sodium hypochlorite containing an excess of sodium carbonate are less subject to yellowing; (c) oxycellulose becomes quite one hundred times as dark as cellulose on steaming, but hydrocellulose is less affected than cellulose. The main cause of the yellowing of cotton on steaming is therefore the presence of oxycellulose.—"Journal of the Textile Institute."

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(The End.)

## DU PONT ANNOUNCES PONTACYL BRILLIANT BLUE A

The Dyestuffs Department, E. I. du Pont de Nemours & Co., announces placing on the market Pontacyl Brilliant Blue A, which is Patent Blue A. The color will be furnished to the trade, carefully standardized and uniform in every respect. This dyestuff is so well known that it is hardly necessary to speak about its characteristics.

## NATIONAL ISSUES GUIDE FOR DYERS OF MODE SHADES

Another novelty in the way of shade cards has been produced by the National Aniline & Chemical Company, Inc. This is a three-leaved folder entitled "Mode Shades for Ladies' Dress Goods."

In the whole range of color terminology the question of "mode" shades is probably the least understood. These generally comprise those delicate nuances of color which are only obtainable by expert and judicious use of combinations. The possibilities in this directions are limitless, and the modern woman is no longer satisfied with the pronounced results of the primary and secondary colors.

The National Aniline & Chemical Company, Inc., recognizing this tendency, offers a shade card containing a palette of seven standard "National" dyes, and accompanying this are forty-eight combination mode shades produced by the use of the colors on this palette. These cover a wide range from the delicate corn and straw yellows up to the bloomy russets and navys.

It is the mauve and lavender shades which are going to be in the greatest demand during the coming year and these, together with the always popular taupe, sand and smoke effects in the latest varieties, are all fully covered in this treatment.

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This is probably the first time an attempt has been made to guide the users of dyes into the inexhaustible realm of fashion shade combinations, and it cannot fail to meet with the approval of all those dyers who are endeavoring to meet the demands of the market, and to keep in intimate touch with the vagaries of fashionable requirements.

The A. C. Staley Manufacturing Company, corn products, of Decatur, Ill., announces the recent opening of branch sales offices in Boston, New York and Spartanburg, S. C., which will enable them to render even better service to their textile trade. The Boston office at 88 Board Street is in charge of L. R. Dickinson, who has been calling on the mill trade in New England for the last two years. W. H. Randolph, Jr., has been appointed manager of the New York office, 1310 Havemeyer Building, 25 Church Street.

## TEXTILE ALLIANCE ASKS QUICK ACTION ON DISTRIBUTION OF REPARATION COLORS

**Statement Names Kuttroff, Pickhardt as Concern Protesting Against Alliance Service in This Capacity; Declares U. S. May Lose Current Share Unless Receiving Body Is Designated**

Further light on the recent charge of Albert M. Patterson president of the Textile Alliance, Inc., that the Department of State was influenced by present or former German agents to terminate its agreement whereby the textile body had been acting as a distributor of the reparation dyes, has been furnished by a statement issued to the press by the Alliance. This statement follows in full:

The Textile Alliance, Inc., acting on behalf of the textile trades of the United States, feels compelled to make public the present situation regarding the importation into the United States of the so-called reparation dyes, hitherto received from the Reparation Commission and imported for impartial distribution among American consumers by the Textile Alliance as agent of the Department of State.

Owing to the abrogation of this arrangement by the Department of State a condition has arisen of immediate concern to the American consumer, and of very real importance to the nation. Unless action be taken to continue the importation of these dyes, either through a Governmental Department or through some representative non-profit organization, such as the Textile Alliance itself, the German monopoly, acting through its agents or representatives here, must again regain control of the market for importable dyes. It is to avert such a result that the Textile Alliance now seeks to have the Reparation Commission continue the allocation of these dyes, either to the Textile Alliance or to some other American non-profit organization. The Reparation Commission has indicated its willingness to follow any intimation the United States Government may make to this effect. Such recommendation will avoid a situation in which the American consumer must become the helpless tributary of the German dye monopoly—best known to history as the inventors and suppliers of poison gas.

The following brief statement will explain the existing situation:

The Textile Alliance, Inc., is a New York State, non-profit, membership corporation, whose voting members and directors are nominees of trade associations representing practically the entire textile trade of the United States.

In October, 1919, and several times since, the Textile Alliance, Inc., without solicitation on its part, was requested by the Department of State to undertake—and it did undertake—the purchase and distribution of reparation dyes according to the United States.

In October, 1921, a protest was filed with the Department of State against the continuance of this arrange-

ment by Messrs. Kuttroff, Pickhardt & Co., Inc., a New York corporation, owned and managed by American citizens of German birth, who formerly in their corporate or private capacities were agents of the Badische Anilin & Soda-Fabrik, one of the six constituent members of the German dyestuff monopoly.

The Department of State on December 14, 1921, abrogated the arrangement with the Textile Alliance, Inc., stating that there was no dissatisfaction with the work of the Alliance and that there was no objection by the Department to the Reparation Commission continuing the allocation of reparation dyes to American non-profit organizations. Later, letters were given by the Department to Messrs. Kuttroff, Pickhardt & Co., Inc., and to other former representatives of the German dye monopoly, stating that the Department had no objection to the Reparation Commission allocating reparation dyes to them.

As a result the Reparation Commission refuses to continue to supply reparation dyes to America until the Department of State shall decide who the recipients of the American portion shall be.

If the allocation be divided among profit-seeking corporations, connected or formerly connected with the German monopoly, the effect will inevitably be to re-establish the control not only of reparation dyes, but of all German dyes, in the hands of the German monopoly, of those representing it.

The Textile Alliance, Inc., does not seek to continue this work itself and would prefer to have it in the hands of a Government Department.

The situation as it now stands is a victory for the German dye monopoly, and the Textile Alliance, therefore, deems it necessary to call attention to the very serious danger confronting the American textile interests and the American people as a whole; a danger which prompt action alone can avert.

## TEXTILE COLOR CARD ASSN. INSTITUTES BOARD OF ADVISERS TO INCREASE SERVICE

**Luncheon at Astor to Follow Annual Meeting March 1**

In order to aid to a greater degree the many industries which come under the influence of color, the Textile Color Card Association of the United States, Inc., has instituted a Board of Advisers, which will represent various basic and affiliated industries.

Through the co-operation of their respective associations, members of this new Board of Advisers represent the knit goods, cotton, worsted, garment, shoe, leather and hosiery industries, and the Metropolitan Museum of Art. These, together with the other leading industries, such as silk, wool, millinery, now officially represented on the board of directors and color committee of the association, will practically embrace all of the textile and kindred industries most vitally interested in color consumption.

The Textile Color Card Association aims to give great-



er service to each individual industry and in turn be brought into more personal and intimate contact with the industries which it is now serving.

The members of the advisory board have been officially appointed by their respective associations, not only to further advancement of industrial color development, but to further promote color standardization as well. They will be the guests of honor at a luncheon, which will follow the annual meeting of the association on March 1 at the Hotel Astor.

The associations represented by the newly appointed board are as follows:

American Association of Woolen & Worsted Manufacturers, John Love, Graupner, Love & Lamprect; the Converters' Association, Arthur Beir, Arthur Beir & Co.; National Boot & Shoe Manufacturers' Association, John C. McKeon, Laird, Schobel & Co. of the United States, Inc.; National Shoe Retailers' Association of the United States of America, Inc., John Slater, J. & J. Slater; Tan-ners' Council of the United States of America, Burt W. Rankin, Hunt-Rankin Leather Company; United Waist League of America, A. S. Ortenberg, Deutz & Ortenberg; Associated Dress Industries of America, Jacob J. Gold-  
man, Goldman Costume Company; the National Knitted Outerwear Manufacturers' Association, Milton Katzen-  
berg, N. Nusbaum & Co.; Association of Cotton Textile Merchants of New York, W. S. Brewster, Lawrence & Co.; National Association of Hosiery & Underwear Man-  
ufacturers, Emery-Beers Company, Inc.; National Gar-  
ment Retailers' Association, Franklin Simon, Franklin  
Simon & Co.; the Metropolitan Museum of Art, Richard  
F. Bach, associate in industrial arts; Cloak, Suit and  
Skirt Manufacturers' Protective Association, Max  
Meyer, of A. Beller & Co.; National Association of Fin-  
ishers of Cotton Fabrics, Phillip A. Johnson, of the  
Aspinook Company.

#### NOTES OF THE TRADE

The directors of the Watham Bleachery & Dye Works have declared a dividend of \$5 a share, payable March 1 to holders of record February 6.

A new artificial silk throwing company has been formed, under the name of the Textile Throwing Com-  
pany, at Hawthorne, N. J.

Owen F. Platt has accepted the position as overseer of dyeing for the Paton Manufacturing Company, Sher-  
brooke, Quebec, Canada. Mr. Platt comes from Spring-  
field, Mass.

The Lyonnaise Silk Dye Works, Inc., Central Falls, R. I., has been incorporated to conduct a dyeing and finishing business. Capital, 500 shares of no par value. Incorporators: Jules Chaussabel, Alben Montchal and Martha Chaussabel.

### Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its dis-  
trict and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume re-  
sponsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspond-  
ence may be in English unless otherwise stated. Symbols: \*Reported by American consular officers; †Report-  
ed by commercial attaches and trade commissioners; ‡Di-  
rect inquiries received by the Bureau.

673.\*—A mercantile company in Canada desires to purchase *gingham wash goods*. Quotations should be given f. o. b. Canadian station. Cash to be paid. Ref-  
erences.

693.\*—A merchant in Canada desires to purchase *ducks, cotton tweeds* and all *cotton goods* which are used in the making of shirts and overalls. Quotations should be given f. o. b. Canadian port. Cash to be paid. Ref-  
erence.

691.†—A firm of manufacturers' agents in South Af-  
rica desires to secure the representation of firms for the sale of *textiles*, such as *calicoes, muslins, denims, voiles, silk, artificial silk and cotton hosiery*, and *underwear*.

682.\*—A merchant in Sweden desires to purchase hab-  
erdashery, *textiles* and women's wear. Quotations should be given c. i. f. Gefle, Stockholm or Goteborg. Payment: Cash against documents. References.

683.†—Agencies are desired by a firm in Victoria, Aus-  
tralia, for the sale of *cotton piece goods*, linoleums and toilet articles. References.

703.\*—There is a market in Italy for *colored and white woolen rags and cotton waste material*. Quotations should be given c. i. f. Leghorn or Genoa. References.

771.\*—A mercantile firm in Czecho-Slovakia desires to purchase *wool and cotton*. Quotations should be given c. i. f. German, French or Holland ports. Correspondence should be in Czech or German. References.

773.\*—A merchant in England wishes to act as selling agent or representative for American firms dealing in *cotton and woolen piece goods* and ready-made clothing for men, women and children. Quotations should be given f. o. b. American port. Reference.

775.\*—The purchase and agency are desired by a firm in Nova Scotia for the sale of from 1 to 50 tons of *cotton seine twine*. Quotations should be given f. o. b. Boston or other port of shipment. Reference.

672.†—A commercial agent in South Africa desires to secure the representation of firms for the sale in Transvaal of *cotton goods* and hardware.

776.\*—An inquiry has been received from a merchant in Turkey for the purchase and agency for *gray sheetings, drills, ducks, sugar, coffee, rice, cottonseed oil, flour, etc.* Quotations should be given c. i. f. Constantinople. Terms: Payment against documents in New York. References.

780.\*—A commercial agency firm in India desires to purchase direct machinery for making envelopes, candles, nails and paper, and to secure the representation of paper manufacturers, *textile machinery manufacturers*, and *gray duck and drill manufacturers*. Quotations should be given c. i. f. Calcutta. References.

781.\*—A merchant in Victoria, Australia, wishes to purchase and secure an agency for the sale of *cotton wadding* for padding and upholstery purposes.

678.\*—The purchase of linoleum, *curtains, leather cloth, velvet, etc.*, is desired by a merchant in Sweden. Quotations should be given c. i. f. Stockholm or Goteborg. Terms: Cash against documents in Swedish bank. Reference.

736.‡—Catalogues and prices are requested by a merchant in Nicaragua with a view to securing the representation of firms for the sale of dry goods, such as *silk and fiber hosiery, curtains, laces, corsets, toilet goods, spreads, sheets* and infants' apparel. No reference given.

722.\*—An importer in Syria desires to purchase *cotton thread, also mercerized and lower grade thread, cotton sheeting (cabots), indigo dyed sheeting, shirtings, ox-fords, zephyr, cotton goods with artificial silk stripes, and woolen cloth* for men's and women's wear. Samples of the indigo-dyed sheeting were forwarded and may be examined at the Bureau or its district offices. (Refer to file No. 43257.) Quotations should be given c. i. f. Tripoli. Terms: 25 per cent with order and the balance against documents. Correspondence should be in French. Reference.

744.‡—A request has been received from an importer and commission agent in India for quotations on *cotton gin* and railway stores, machinery, electrical apparatus, hardware, enameled ware, wire fencing, vises, anvils; tool steel, spring steel, mild steel bars and plates; mild steel angles; rolled steel beams; galvanized, corrugated and plain iron sheets; brass and copper sheets and rods; brass and copper pipes; steel, galvanized and wrought-iron pipes; boiler pipes and fittings; motor cars, motorcycles

and parts; foodstuffs; perfumery; glassware; crockery; beds; *cotton piece goods*; woolens; fents; second-hand clothing; boots and shoes; and sundries. References.

## Review of Recent Literature

*Boiled-Off Liquor in the Dye Bath.* George Emmons, "Silk," February, 1922; p. 75.

After briefly defining the difference between raw silk, ecru silk, souple silk and cuit silk, which depend upon the lengths to which the boiling-off process has been carried; and giving a few precautionary measures, author states that when the soap solution has been used for one or a series of boiling-off operations, the liquor will, of course, have in it a good deal of silk-glue and of soap, and this boiled-off liquor is useful in dyeing silk fiber with many dyes. The bath may be made up of, say, nine parts plain water and one part boiled-off liquor. The effect of this addition to the plain water is thought to be a softening of the dyed silk and a facilitation of the evenness of dyeing. The addition of boiled-off liquor will generally or often result in an alkaline condition of the bath, which may be undesirable, and which may be corrected by the addition of sufficient acetic acid.

Author lists direct cotton colors which may be dyed in such a bath as follows: Diamine Scarlet B, Diamine Fast Red F, Congo Orange R, Oxyphenine, Chlorophenine Yellow Y, Chloramine Yellow, Columbia Yellow, Diamine Blue BX, Benzo Blue BX, Toledo Blue B and Diaminogene. These, however, are to be regarded merely as examples. Examples from the basic colors include: Malachite Green, Rosaniline Blue, Victoria Blue, Glacier Blue, Nile Blue A, Ethyl Purple and Violet 6B. Author counsels, when using the first three basic colors listed, the use of sulphuric instead of acetic acid. Anent dyeing silk with the acid colors, he further notes that it is frequently the practice to use a large quantity of boiled-off liquor; the bath may consist, when the general volume of liquor is filled in, of three parts plain water to one part liquor, while sulphuric or acetic acid is used to give the bath a slightly acid or perhaps distinctly acid reaction. It is not to be understood, he states, that the only way to apply acid colors to silk is by means of a boiled-off liquor bath; it is sometimes permissible to omit the liquor, but acetic acid is nevertheless added to give an acid reaction. When the boiled-off liquor is omitted, it will be well for the dyer to work the silk very carefully, for otherwise he may find his shade uneven.

Continuing his consideration of the acid colors which may properly be applied in a bath prepared with boiled-off liquor, author lists many groups, including Picric Acid; Naphthol Yellow, Martius Yellow, Manchester Yellow, Naphthalene Yellow, Naphthylamine Yellow and Aniline Yellow; Naphthol Yellow S, Citronin A, Acid Yellow S and FY; Xylidine Scarlets; Fast Red, Fast Red



A or C, Rocellin, Rauracienne, Cerasin, Orcelin No. 4 and Rubidin Cardinal Red; Acid Magenta, Acid Fuchsine, Acid Rubine, Fuchsine S and Rubine S; Formyl Violet S4B, Alkali Violet 6B (which is classed as an acid color), Alkali Violet R or 4B and Violimine R, and Sulphone Cyanine G, GR, 3R and 5R, Coomassie Navy Blue G, GN, 2RN and 3R.

Methods for various special and typical colors of these series are given, together with a discussion in many cases of their relative merits.

*Patents and Chemical Research.* Harold E. Potts, M.Sc. The University Press, Liverpool. Price 8/6.

Although written in relation to the chemical industry, this book deserves study by all concerned with the protection of their manufactures by patents. It would be difficult to find a better statement of the essentials of patent law and practice generally. Different aspects of important points being separately considered are brought out more forcibly and clearly than they could be in closely knit sequences of proposition and qualification, especially as regards the fundamentals of proper protection by patents—to determine what is the real invention in any case, and its range of application, to give ample and accurate indication of its nature, to make full disclosures of how best to carry it out, and to prepare valid claims which shall be wide enough to prevent evasion.

Three pleas are put forward with cogent argument: That endeavor to work a manufacture as a secret is generally futile; that consequently proper endeavor should be made fully to take advantage of the protection afforded by the patent law, and that for full advantage to be taken a manufacturer should have a policy of wide outlook and regard patents as a protection for his own manufacture against infringement and competition, as a weapon against competition and as a means for negotiating concessions in the broadest sense nationally and internationally. In so far as the compulsory working clauses of the patent laws of some important countries make it practically impossible to hold a patent for long without establishing internal manufacture, it may be urged that the possibility of exchanging concessions internationally merits more consideration than it commonly receives.

In regard to secret processes, there is little chance—as the author points out—of the result of one research being undiscoverable by other research, and even in the rare case of a secret process founded on a lucky and unlikely accident there are many dangers probably amounting to certainty of eventual disclosure. The author suggests an injunction might be granted against an employee intending to disclose a secret, but if the injunction should be disobeyed or disclosure should have been made already it seems impossible to restore the secrecy.

On page 16 reference to those inclined to undervalue patent protection as “opponents of the patent system” is temporarily misleading.

The author is to be commended for forcibly indicating the minute care which ought to be taken to insure that

everything relevant, though it may arise from accident, convenience or even carelessness, should be considered in preparing the specification of an invention, lest any essential should escape attention, as, for example, the unsuspected influence of containing vessels in making a process work. The author is to be commended, too, for emphasizing that the much used saying “a principle cannot be patented” ought for practical purposes now to be forgotten, the word “principle” having become ambiguous in this connection.

The author very strongly urges that patents both as means of protection and as obstacles to be avoided should be taken into consideration even before research begins, and that thenceforward there should be collaboration with the patent agent. While this is emphatically necessary in chemical cases, such collaboration is to be recommended generally.

This is a book to read, and to read through.—H. C., in “Journal of the Textile Institute.”

*Manual of Standard Practice for the Power Laundry Washroom.* Published by the Laundryowners National Association, La Salle, Ill. 112 pages; price \$1.00.

The purpose of the publication is to present in logical order a report of the principal results up to date of the research work on washroom technology which has been done by the Department of Chemical Engineering of the Laundryowners National Association which is maintained at the Mellon Institute of Industrial Research at the University of Pittsburgh.

In all there are eleven chapters, covering the following subjects:

I. Water. With a discussion of hardness and the various methods of water softening.

II. Alkalies. What they are chemically, their choice and use for laundry purposes.

III. Soaps. General discussion of their nature, manufacture and use, with specifications which will serve as a valuable guide to laundrymen in their purchase.

IV. Bleaching agents. With a discussion of those most desirable for laundry work, and their intelligent use.

V. Sours. Why they are necessary, and their harmful effects if not properly used.

VI. Blues. Discussion of the various bluing materials which are available.

VII. Standard formulas for washroom practice.

VIII. L. N. A. Assay Outfit. Description of the apparatus and reagents necessary for carrying out simple methods of chemical control and an aid to the intelligent purchase of supplies.

IX. Sanitary conditions of power laundry output.

X. The use of malt in removing starch in laundering.

XI. The care of metal washing machines.

The publication is another evidence of the activity of the above-mentioned association, which is rapidly becoming well known for its progressiveness and successful endeavor to apply scientific principles and technical knowledge to the practical pursuance of their industry.

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

J. E. F.—*Question*: Why is it so difficult to obtain a full rich shade on Tussah silk? I have used dyestuffs that seem to have affinity for the fiber and exhaust the bath, but the shade on drying is always thin and slaty.

*Answer*: The reason is to be found in the structure of the silk fiber itself. Ordinary Japan silk under the microscope shows no more structure than a glass rod and, when colored by dyeing, reflects light and color as any colored cylinder would. On the other hand, all the wild silks, generally designated "Tussah," appear under the microscope as strongly striated fibers, like a bundle of very fine glass rods. The result is that the reflected light is so broken up by the many reflecting or diffusing surfaces that the true color is obscured by its own high-lights and shadows, and the effect is the same as if gray were added to the color. The same illusion is seen in the white froth of ink and the white powder produced by grinding black or blue glass. However, when the surfaces of the fibers are filled up by some insoluble substance—a finishing paste, for instance—there is a loss of luster but an increase in the depth of color.

A. D.—*Question*: What is the best method of coloring chrome-tanned leather, and what dyes should I use?

*Answer*: The coloring of chrome-tanned leather is so closely related to the making of the leather that it must always be borne in mind that the obtaining of any particular color is not the whole object. Chrome-tanned leather is regarded as an "empty" material which must be "filled" in order to make good leather. The filling is done by means of wood extracts related to the tannins but containing a minimum of tannin. Logwood is used for blues and blacks, and fustic, osage orange, quercitron and sometimes gambier for browns and other fancy colors, with hypernic when a redder tone is desired. These extracts are applied in a drum at not over 120 deg. Fahr., then fixed by various metallic mordants and washed. This gives a well-penetrated bottom color upon which the final shade is obtained either by the use of acid dyes, which penetrate in some cases and in others dye only the surface, or by the use of direct cotton dyes, which are en-

tirely surface colors. While the extracts may be calculated on the weight of the skins, it is evident that the surface colors should be figured not on weight but on the number of square feet of surface in the pack. After coloring, a fat liquor is applied; this is an oil emulsion made with soap, sulphonated oil or egg yolk, according to the kind of leather being made.

The action of any fat liquor is to modify the color as do oil and glycerine, which may be applied before drying. Then the dried leather generally receives a finish or seasoning, and possibly a glazing, ironing or rolling. The seasoning may be colored to modify the final shade, and often insoluble pigments are used to fill the surface pores. To sum up, in order to duplicate the practical work of another tannery it is very necessary to know every detail of the process and run the laboratory tests on a practical basis as nearly as possible.

B. H. S.—*Question*: Does an after-treatment with chrome and bluestone increase the fastness of all direct dyes more or less, or is it only good for certain ones?

*Answer*: Fastness to light is improved in such dyes as are capable of uniting with copper, generally with a change in shade; but with those where there is no union the dye may be oxidized and made even less fast than before the treatment. Treatment with bichromate involves, first, an oxidation of the dye, which may or may not then combine with the chromium salt. In this case also there may be an increase in fastness to washing, but not necessarily; all depends on the properties of the dye in question. The same is true of formaldehyde after-treatment; some dyes are improved and others are not. There is no general after-treatment that will improve fastness of all colors in any respect.

P. R.—*Question*: What were the pre-war developers which were lettered A, B, C, D, etc., and what shades did they produce?

*Answer*:

Developer A—Beta-naphthol: red with primuline.  
Developer B—Ethyl beta-naphthylamine: bordeaux.  
Developer C—Meta-toluylenediamine: russet.  
Developer AD—Amido-di-phenylamine: fast blue.  
Developer E—Solution of C.  
Developer F—Resorcine: orange.  
Developer G—Gamma amido-naphthol sulphonate soda: blue (Blue Developer AN).  
Developer H—65 per cent strength of C.  
Developer J—Phenol: yellow.  
Rubin Developer—Alpha naphthol.

Other products used as developers were generally sold under their true chemical names.

The Capital Silk Company, of Paterson, N. J., has been incorporated with a capital of \$50,000. The incorporators are Harry Gold, Sadie Gold and Abe Gold.



## Recent Patents

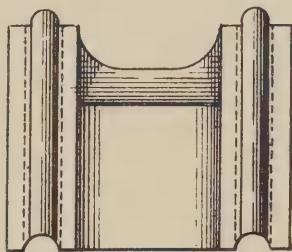
### Coke-Oven Heating Wall, and the Like

(1,404,061; January 17, 1922)

ARTHUR ROBERTS, Evanston, Ill. (assignor to American Coke & Chemical Company, Chicago, Ill.)

Patentee has already described in U. S. Patent 1,132,685 the construction of a coke-oven wall which is provided on its interior with a meshwork of interconnected gas passages of such form that the gases traveling there-through are caused to deflect back and forth in a zig-zag manner as they travel through the wall, thereby being driven with violence against the wall and caused to impinge thereagainst. In the particular construction illustrated in this patent was also shown a convenient form of block from which to build or construct the walls so as to obtain the aforesaid meshwork of impingement passages. The present invention relates to an improved type of heating wall construction, and also the construction of the notched blocks for the same.

One of the objects of the invention is to improve the



form of the notched block so as to thereby cut down or diminish the frictional resistance of the gases as they pass through the wall. Another object is to provide a construction of block which can be very economically molded and manufactured, thus reducing the cost of construction very materially.

The accompanying illustration shows a side elevation of one of the intermediate blocks, which is recessed and notched in such a manner that when set together horizontal passages will be formed by the notches. The upper portion of each block is tapered or V-shaped so as to split the gas streams and thus reduce the resistance to the flow.

One of the four claims allowed is for a coke-oven heating wall comprising horizontal courses of blocks, the blocks of consecutive courses breaking joints with each other, each block having its sides recessed to thereby reduce the width of the central portion of the block, and having its top portion recessed to thereby provide a horizontally extending passage beneath the block above it, said top portion being tapered or wedge-shaped, whereby the side recesses of adjacent blocks co-operate to provide vertically extending passages between the blocks in communication with the aforesaid horizontally extending passages, and whereby the tapered top portions of the blocks serve to split the gas streams and prevent the ac-

cumulation of deposit on the top portions of the blocks, substantially as described.

### Process for the Purification of Anthraquinone

(1,404,056; January 17, 1922)

EMIL PORTHEIM, Prague, Republic of Czecho-Slovakia  
(assignor to the firm of Kinzlberger & Co., Smichov-Prague, Czecho-Slovakia)

Patentee claims it has been discovered that it is possible to purify anthraquinone perfectly in a single operation without loss. It is only necessary to treat the crude anthraquinone dissolved in a neutral solvent, with the purifying agent. As such purifying agent there may be employed on the one hand alkaline substances, such as caustic alkalis, alkaline carbonates (e. g., carbonates of the alkali metals), calcium hydroxide and the like, which can be used in aqueous solution, and on the other hand sulphuric acid, which can be employed concentrated or moderately diluted. The impurities pass over into the alkali or the sulphuric acid, and the solution is left pure.

Example 1.—Twenty-five parts by weight of crude anthraquinone containing 91.5 per cent of anthraquinone are boiled with 250 parts by volume of chlorobenzene and 10 parts by volume of a 1:1 solution of caustic alkali, the mixture being well stirred. The chlorobenzene and water distill off slowly. The solution becomes gradually purer. The boiling is interrupted when a sample of the solution, mixed with some finely powdered caustic soda and boiled, no longer darkens the color of the latter. Should the dark coloration still take place to a slight degree and longer boiling not lead to the desired result, some potash lye should be added; in most cases, however, the quantity specified is sufficient. The solution is withdrawn, the anthraquinone that is precipitated after the cooling is drawn off, and the chlorobenzene is removed by means of steam and dried. The anthraquinone is perfectly pure.

Example 2.—Twenty-five parts by weight of crude anthraquinone containing 90 per cent of anthraquinone, 450 parts by volume of coal-tar naphtha boiling at 126 to 130 deg. Cent., and 10 parts by volume of a 1:1 caustic potash solution are treated as in Example 1.

Example 3.—Twenty-five parts by weight of crude anthraquinone as above, 250 parts by volume of chlorobenzene and 30 parts by weight of sulphuric acid of 60 deg. Be. are boiled until no further purification takes place. The subsequent treatment takes place as in Example 1. The anthraquinone is of 99.5 per cent strength.

### Purification of Crude Anthracene

(1,404,055; January 17, 1922)

EMIL PORTHEIM, Prague, Republic of Czecho-Slovakia  
(assignor to the firm of Kinzlberger & Co., Smichov-Prague, Czecho-Slovakia)

Patentee states that the known processes for freeing crude anthracene from carbazole by means of potassium hydrate are discussed fully in German Patent No. 178,764 and there is opposed to the earlier processes as the most advantageous that based on the fusion of crude anthra-

cene with caustic potash and the subsequent distilling off of the anthracene in a vacuum.

All these processes, including the process of German Patent No. 178,764, have in common the employment of high temperatures. German Patent No. 111,359 recommends the temperature of 260 deg. Cent.; in the process of German Patent No. 178,764 the anthracene is distilled off from the carbazole-potash melt in a vacuum, which likewise requires a temperature of far above 200 deg. Cent. Beilstein, Vol. IV, p. 390, gives the temperature at which carbazole potassium forms from carbazole and potassium hydrate as 220 to 240 deg. Cent.

In face of these statements, the invention has for its basis the discovery that the theoretical yield of carbazole potassium from carbazole and potassium hydrate can be obtained at much lower temperatures if the carbazole be mixed with potassium hydrate in the presence of a solvent for carbazole and anthracene, for example hydrocarbons, and boiling until carbazole potassium is formed, water being meanwhile distilled off. In this manner it is possible to produce carbazole potassium even at the boiling point of toluol. On the basis of this discovery, the carbazole can be separated from the crude anthracene in the theoretical quantity.

By employing the low temperature it is possible to avoid the losses which are unavoidable when working according to the processes of the above-mentioned patent.

The water formed in the aforesaid reaction may be advantageously distilled off mixed with the solvent or larger quantities of caustic potash may be employed, in which latter case the excess of caustic potash absorbs and retains the water.

First example: Crude anthracene, containing 53.4 per cent of anthracene, is purified by dissolving it in naphtha of a boiling point of 145 degrees. Semi-purified anthracene containing 70 per cent of anthracene is obtained.

One hundred parts by weight of this substance, containing 70 parts of anthracene, are boiled with 30 parts by weight of 75 per cent strength powdered caustic potash and 300 parts by weight of naphtha of a boiling point of 145 degrees, and simultaneously stirred, the boiling being continued so long as water mixed with naphtha passes over. If required, the naphtha distilled off must be replaced by introducing fresh naphtha, in order that the anthracene shall certainly remain in solution. The carbazole potassium separates gradually as a heavy sandy precipitate. When the reaction is complete, the hot anthracene solution is drawn off and after cooling there is obtained an anthracene which when drawn off and separated from the naphtha has a degree of purity far above 90 per cent and contains no trace of carbazole. The carbazole potassium is freed from the naphtha by means of steam and simultaneously decomposed into carbazole and potassium hydrate. In this manner it is possible, at temperatures which can be easily reached by indirect steam heating, to separate from each other and obtain anthracene and carbazole in a very simple manner, almost without loss and of an excellent degree of purity.

If in the above example the amount of caustic potash

is doubled, complete separation of anthracene and carbazole is obtained under the reflux condenser and even at temperatures below the boiling point of the solvent employed. It is, however, possible to effect the separation in employing the quantity of caustic potash given in the example and using the reflux condenser, but in this case a much longer period of time is necessary to cause the caustic potash to react in a sufficient degree.

Second example: One hundred and fifty parts by weight of crude anthracene containing about 50 per cent of anthracene are dissolved by means of coal-tar naphtha of a boiling point of 130 deg. Cent., and the paste obtained, which contains about 70 per cent of pure anthracene, is heated to 120 deg. Cent. with 200 to 300 parts by weight of naphtha and 60 parts by weight of 80 per cent caustic potash for some hours, the mixture being meanwhile well stirred.

The further treatment takes place as described in the first example. The anthracene is free from carbazole, and the carbazole is free from anthracene.

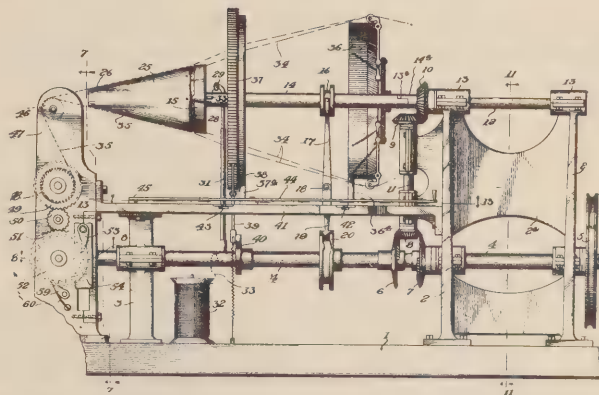
### Means for Producing Tubular Fabrics

(1,403,785; January 17, 1922)

EMANUEL INGHAM, San Diego, Cal.

This invention is in the nature of a further development of that covered by inventor's prior Patent No. 1,328,794, dated January 20, 1920, and copending application Serial No. 279,511 filed February 27, 1919.

While the apparatus disclosed in the above-mentioned patent and application is intended for use in producing curved fabrics, U-shaped in cross-section, the present invention contemplates the provision of means for producing a complete tubular fabric in indefinite lengths. The



invention consists therefore in so supporting the parts of the mechanism as to permit of a closed tubular fabric, formed in accordance with patentee's above-mentioned application, to be continuously removed from the machine without the necessity for cutting the same.

The illustration is a side elevation of the improved machine, showing means for supporting the needle and associated parts so that the completed tubular fabric may be continuously removed.

Referring to the drawings in detail, the machine is mounted on a suitable base 1. Adjacent one end of this



base is secured an upright framework consisting of pedestals 2 united by webs 2a, and adjacent the other end of the base 1 is mounted a pedestal 3. A main shaft 4 is journaled in suitable bearings in the pedestals 2 and 3, and carries at one end a pulley 5 to which power may be applied for driving the machine. To the shaft 4 is secured a pair of mutilated beveled gears 6 and 7 which mesh with a beveled pinion 8 secured to the lower end of a short vertical shaft 11 carrying at its upper end a beveled pinion 9 which meshes with a similar pinion 10 secured to a sleeve hereinafter described.

A fixed rigid arm or shaft 12 is securely clamped at its rear end in split sockets 13 carried at the upper ends of the pedestals 2, and such shaft extends forwardly nearly the full length of the machine, thus constituting a cantilever structure.

Journaled on this shaft 12 is a sleeve 14 having a rear portion 14a to which the pinion 10 is rigidly secured, the section 14a being united with the section 14 by means of a longitudinal separable coupling 13a. At its forward end the sleeve 14 carries a circular oscillatory needle 15 similar in all respects to the needle shown in detail in the prior applications.

A grooved collar 16 is secured to the sleeve 14, and in the groove of such collar works the bifurcated end of a level 17 pivoted at 18 to a fixed bracket and having its depending lower end 19 engaging a cam grooved in a cam member 20 which is secured to the shaft 4.

The end of the shaft 12 projects forwardly beyond the needle 15 and on such forwardly projecting end is rigidly mounted the form around which the fabric is woven. This form consists of a circular ring or disc 21 clamped to the shaft by means of a setscrew 22. This ring is disposed adjacent the needle and is of substantially the same diameter. It constitutes the foundation around which the weft thread is laid by the needle and encloses the loop-interlocking mechanism. This body when in position is circular at the rear end and flattened and elongated laterally at its front end.

A short tubular thread guide 28 of suitable shape is secured to the needle and the weft thread 23 passes to the needle through this tube from the flared mouth 29 of a thread guide 31, the upper end 30 of which is preferably swiveled.

It will be understood that as the needle oscillates, the swiveled end 30 of the thread guide swings from side to side as may be required to properly accommodate the pull of the thread. The weft thread 33 enters the lower end of the guide tube 31 from a fixed reel 32.

The figure 34 designates the warp threads which, as in the prior application Serial No. 279,511, pass through a tension device 36 and a heddle mechanism 37, such threads being fed from fixed reels (not shown).

The heddle mechanism is operated as in said prior application by means of ratchet mechanism 39 actuated by a cam 40 on the shaft 4. The tension and heddle mechanisms which are entirely free from the arm 12 each comprise two separable halves and are supported on pedestals 36a and 37a, respectively. The selections of the

tension mechanism pedestals are adapted to slide in an arc-shaped groove 42 and the sections of the heddle mechanism pedestals are adapted to slide in an arc-shaped groove 43, these grooves being formed in a suitable supporting table 41 and being struck from a common center. This center is the pivot pin 45, on which pin is pivoted a pair of operating handles 44 which are suitably connected to the sections of the tension and heddle mechanisms as described in the prior application.

It will be understood that as the fabric 35 is woven by the oscillating needle 15 around the form 25 it is drawn off of the front end of such form by means of the take-up mechanism. This take-up mechanism comprises a guide roller 46, over which the fabric passes, such guide roller being supported near the upper end of a pair of standards 47. Also journaled in these stands is a take-up roller 48 on which the fabric is wound. The roller 48 has secured to one end a gear 49 which is operatively connected to a similar gear 51 by means of an intermediate pinion 50. This construction renders it possible to vary the speed of the roller 48 by taking off two of the gears and substituting others of different relative diameters. The gear 51 is journaled on a stud carried by one of the standards 47 and has formed integrally therewith a ratchet wheel 52. This is adapted to be engaged by a pawl 53 pivoted to a reciprocating block 54 suitably mounted in guideways in the standard 47 and actuated by means of a lever pivoted and caused to vibrate by means of a cam secured to the shaft 4. The end of the lever is preferably rounded and fits into a notch or pocket in the block 54. The lever is actuated in one direction by means of a spring. A locking pawl 59 pivoted to the standard 47 and urged against the ratchet 52 by means of a spring 60 serves to prevent backward rotation of the take-up roll 48.

Among the claims is that for the combination with a rigid arm of a circular weft needle mounted for oscillation thereon and a warp supporting form associated with said needle and carried wholly by said arm.

### Drawing Tube for Ring Spinning Machines

(1,404,165; January 17, 1922)

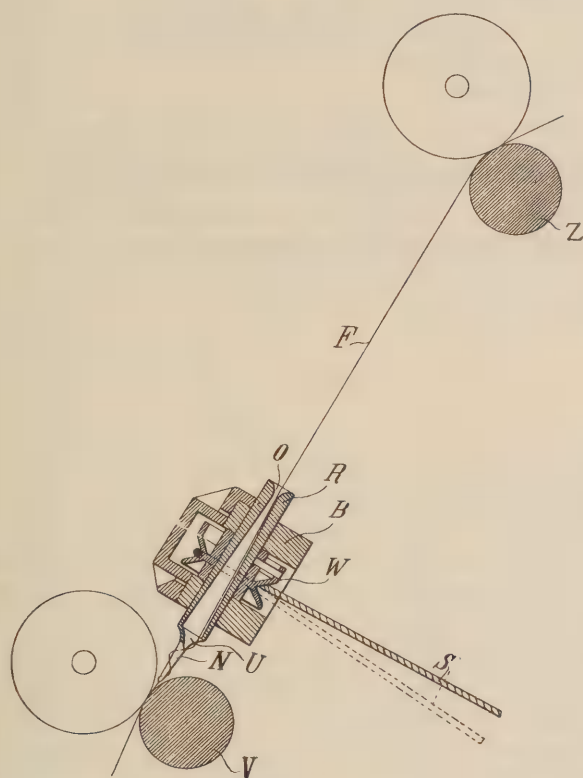
LUDWIG SCHORSCH, Biala, Austria (assignor to firm of G. Josephy's Erben, Bielitz, Austria)

Patentee states that the use of the ring spinning machine for spinning carded yarn requires highly skilled operators when it is desired to work the ring spinning machine in an economical manner, with the smallest possible number of operators, because it is difficult to insert broken roving into the drawing tube while the machine is working.

This is the chief reason why the ring spinning machine has up till now been employed only to a comparatively limited extent for working on carded yarn. Consequently the designers of ring spinning machines have been directed to producing a drawing tube which will feed the yarn automatically to the drawing rollers.

This invention has for its object to provide an improved drawing tube for ring spinning machines working on carded yarn which feeds the yarn automatically to the drawing rollers, so that it is no longer necessary to draw the roving with a hook through the drawing tube, but it is sufficient to introduce the roving by hand into the upper opening of the drawing tube.

The automatic drawing of the roving through the drawing tube is effected by providing the drawing tube according to this invention with a conical bore instead of the usual axial cylindrical bore, said conical bore increases



ing in diameter from the inlet opening toward the yarn outlet opening. Or it is provided with a bore inclined toward the axis of the drawing tube.

In the illustration, the roving *F* delivered by the feed rollers *Z* passes through the inlet aperture *O* into the drawing tube *R*, which is mounted in the tube stand *B*. The drawing tube is rotated by means of the cord *S* passing around the whorl *W*.

The bore of the drawing tube, instead of being cylindrical as usual, is made of conical shape, enlarging from the upper aperture *O* toward the needle *N*, or the bore of the drawing tube is inclined to the axis of the tube. By this means the end of the roving which enters the upper aperture *O* is carried round by its friction against the side of the drawing tube.

The centrifugal action produced by the rotation of the roving imparts to the latter a tendency to increase its radius of rotation and thus move away from the axis of rotation of the tube. The result of this is to cause the end of the roving to follow the downwardly increasing bore of the tube or the bore which is gradually receding from

the axis of the tube, and thus pass through the latter, whereupon on issuing from the lower aperture *U* the roving is caught by the needle *N* and fed to the drawing rollers *V*. For yarns which are being spun with small draw, such as waste cotton, waste linen and the like, the arrangement of the drawing tube according to the illustration is sufficient. For woolen yarns, however, which are spun with a larger draw, it is necessary to impart to the roving that vibrating motion which is attained, when spinning with the selfactor, by the turning of the roving over the point of the rotating spindle, and which enables to attain the large draw.

For this purpose the upper end of the drawing tube is not truncated but is provided in the same manner as the lower end with a needle over which the roving is compelled to turn once at each revolution of the drawing tube in a similar manner as it does over the point of the spindle of the selfactor.

The improved drawing tube constitutes an important improvement in ring spinning machines working on carded yarn, the manufacture is rendered more easy and is increased, because it allows of dispensing with the drawing of the roving by means of a hook through the tube, which operation takes up a great deal of time and requires skilled operators. The attendance on the machine is thus considerably simplified.

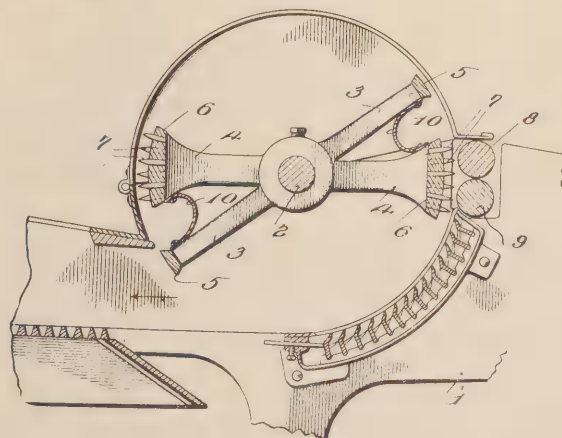
Besides, by this construction of the drawing tubes the applicability of the machine and the quality of its yield are increased, because both materials with a large draw and such with a small draw can be spun in a profitable manner.

#### Beater for Cotton Pickers

(1,403,975; January 17, 1922)

AMASA ST. ONGE, Providence, R. I.

This relates to cotton pickers, and particularly to devices employed for opening and combing the cotton so as to clean the staple in its progress to the spinner. The ob-



ject of the invention is to provide a simple and highly efficient beater which will effectively open up the cotton and then shake out the dirt without in any way weakening the staple or creating waste, the improved beater being adapted to first shred the cotton as it is feeding in the



usual manner and to then immediately strike it a gentle blow to dislodge foreign matter.

The illustration is a vertical sectional view taken transversely of the power shaft and showing feed rolls, grids and second grids, stripping plate and bonnet of conventional form.

There is indicated a supporting frame 1 and at 2 is shown a shaft adapted to be suitably power driven. Fixed to this shaft are a plurality of pairs of arms 3 and 4, the arms 3 forming the support for beater bars 5, these arms and bars constituting what shall be termed the plain beater. The arms 4 are the support for cross-pieces 6 from the surface of which project pins 7, and are termed the pin beater. The arms of each pair 3 and 4 are in alignment, but the respective pairs of arms are on different radii; complementary arms of each pair—that is to say, an arm 3 and an arm 4—are arranged with a slight intervening space of less than 90 degrees between them, so that upon the clockwise revolution the pin beater will engage the cotton staple slightly in advance of the blow on the latter from the plain beater, the engagement of these two arms with the staple occurring at the point of feed of the latter between the rollers 8 and 9. In order that the suction in the machine shall not effect a drawing of the staple between the pin beater and the plain beater, the space between the complementary pairs of beaters is bridged with a shield 10, preferably of sheet metal.

The operation of the beater will be apparent and the advantages resulting from first opening up the cotton by engagement of the pin beater therewith and the subsequent quick beating of the cotton so combed which effectively loosens all foreign matter are manifest. A picker embodying features of the improved type herein disclosed may be operated with a great saving of power, the speed at which the beater must revolve being less than that where but a plain beater or a pin beater is alone employed, and the improved beater insures removal of more dirt from the staple and this means better running work and less waste.

#### Method of Making Acetic Anhydride

(1,403,920; January 17, 1922)

CHARLES J. STROESACKER, Midland, Mich. (assignor to the Dow Chemical Company, Midland, Mich.)

While it has heretofore been proposed to make acetic anhydride,  $(\text{CH}_3\text{CO})_2\text{O}$ , by reacting on a suitable acetate with sulphur chloride (see German Patent No. 132,605), this method of manufacture has since been superseded by other methods, the more modern of which will be found described in Worden's "Technology of Cellulose Esters" (Vol. VIII, pp. 2526 et seq.). The principal of these more modern processes is that of Goldschmidt, who, in his German Patents (Nos. 222,236 and 241,898) points out the deficiencies in the older method above referred to.

Inventor has found, however, that by proper manipulation, and particularly by proper control of the temperatures and pressures employed in the process, such older method, consisting, as stated, in reacting directly with sulphur chloride on a suitable acetate, may be made a

commercial success. Obviously, in view of the greater convenience in handling sulphur chloride, instead of the reagents involved in the so-called more modern processes, this older process is the preferable one.

The present improvements accordingly consist of the steps hereinafter fully described, the following description setting forth only one specified method of carrying out the process.

Inventor uses a suitable acetate, preferably sodium acetate, two parts, and, placing the same in a suitable vessel which can be closed, adds gradually thereto one part of sulphur chloride, specifically the dichloride ( $\text{SCl}_2$ ). During this stage in the operation the mixture is kept under pressure, approximately 5 pounds above atmospheric, and is cooled the while by applying water to the outside of the vessel, so as to maintain a temperature of the contents within at approximately 20 deg. Cent. Under these conditions, the resultant acetic anhydride does not tend to volatilize to any serious extent, but remains relatively quiescent in the mixture.

The principal reaction that occurs is well understood, being represented by the formula:



This reaction is practically instantaneous, and is complete as soon as the ingredients have been brought together in the proper proportions as indicated.

As soon as such reaction is complete a vacuum is applied and the mixture gradually heated so as to distill off the acetic anhydride, the temperature being gradually carried up to approximately 110 deg. Cent., by which time all of the anhydride should have distilled over. There will be some acetic acid formed incidentally to the distillation stage which requires to be fractioned off from the product, but the amount of such acid is not serious, the formation thereof, as well as of other more baneful intermediate products, such as sulphur dioxide, being almost entirely prevented by carrying out the reaction and distillation under the conditions of temperature and pressure described.

Other modes of applying the principle of this process may be employed instead of the one explained.

The claims are:

1. The method of making acetic anhydride, which consists in mixing an acetate with sulphur chloride; maintaining the mixture at a temperature of approximately 20 deg. Cent. and under a pressure of approximately 5 pounds above atmospheric; then applying a vacuum and gradually raising the temperature to approximately 110 deg. Cent., whereby the anhydride is distilled off.

2. The method of making acetic anhydride, which consists in slowly adding one part of sulphur dichloride to two parts of dry sodium acetate; maintaining the mixture at a temperature of approximately 20 deg. Cent. and under a pressure of approximately 5 pounds above atmospheric; then applying a vacuum and gradually raising the temperature to approximately 110 deg. Cent., whereby the anhydride is distilled off.

TEXTILES

PAPER

LEATHER

# AMERICAN DYE STUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

MARCH 13, 1922

NUMBER 6

## FEATURES OF THIS ISSUE

"A Few of the Important Factors Affecting the Application of Dyestuffs," by Leverett N. Putnam, discusses many of the causes of defects.

Part II of "The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture" takes up simple and compound microscopes, their applications, and accessories.

In Part III of "Modern Views on Soap," Charles F. Goldthwait continues his consideration of the various phenomena observed during a close study of this substance.

Proceedings of the A. A. T. C. C. include an account of the joint meeting of the R. I. Section with the local section of the A. C. S.; organization meeting of the Northern New England Section, and an abstract of the paper by Robert Spurr Weston.

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the Practical Application of Dyestuffs and the Mechanical Equipment Incidental Thereto

VOL. X

NEW YORK, MARCH 13, 1922

Number 6

## A Few of the Important Factors Affecting the Application of Dyestuffs

Recent Paucity of Dyestuffs Has Compelled Increased Study and Knowledge of Unconsidered Substitutes  
—Colors in Combination Must Be Studied Separately—Cloudiness and Shadedness—Causes of Variations in Piece Dyeing—Influence of Rate of Temperature Increase  
—Per Cent Variation in Steam Pressure

By LEVERETT N. PUTNAM

**B**EING a dyer is a very interesting calling owing to the new conditions which are always coming up to be solved. It is a trade that is not learned so much by the cramming of specific, known facts as by the everyday observations as work goes on. By constant notice little features are observed, which, when added to some other more or less obscure fact of the past, make a concrete whole. These, assimilated and stored away, give untold courage and vigor to the dyer when trouble occurs and he needs all the strength and energy of his calling to keep things "right side up."

In this article I have tried to give food for thought on a few dyehouse problems which I feel sure are not at the present time understood as well as they should or could be. However, as a whole, we are surely making progress, and the time is coming when many things will be known as concrete facts which to-day are noted but not thoroughly understood.

### RECENT CONDITIONS A BLESSING IN DISGUISE

As time advances, industry also advances, profiting by the mistakes of the past and by the fulfillment of the old adage, "Necessity is the mother of invention." This condition applies to the textile industry as well as to all others. It has been particularly true as related to dyestuff application in all its forms in the very recent past, owing to the extra stimulus given by the limited amount of various dyewares and the former quality of standards to which people were accustomed. It has taken all the available energy and pains of those who are in any way concerned with dyestuffs and their application to keep up to the times and to continue production with any measure of success.

This condition of affairs has been a blessing in disguise to the textile industry and the people at large, owing to the keenness of mind which it has developed all along

the line—the public at large being the benefactor from the new knowledge gained and from its own new knowledge. At the present time any old thing isn't good enough. In consequence, the public is getting to-day, wherever possible, results much more satisfactory and durable than in pre-war times. As better conditions come it will, in all probability, demand a corresponding improvement.

### COMPULSORY EDUCATION IN SUBSTITUTIONS

One of the fundamental dyehouse troubles in the past and at the present is the application of dyestuffs to produce level and satisfactory shades. In pre-war times if such a condition of affairs arose it could be overcome by substitution of different dyes or methods, thereby overcoming the condition without tracing the trouble, in all cases, to the real cause. As the available dyestuffs became more limited, there came times when certain dyestuffs had to be applied when their use would have been frowned upon as indiscreet under normal conditions, even though the shade, when produced correctly, might be entirely satisfactory to the purchaser. As a result of this condition, numerous dyeing faults crept in where they were not wanted. Among these faults were cloudiness, shadedness, side to center, lap to lap, end to end; also shadedness from piece to piece in the same dye bath, and others which every dyer knows.

To cope with these conditions, having a limited range of colors to choose from, it can readily be seen that the dyer was more or less "up against a stiff proposition." This meant that he had to utilize all known and unknown resources to produce a satisfactory product. Investigation of the causes of trouble had to be carried deeper than ever before by all concerned. In consequence many things were learned that were helpful, not only for the time at hand, but for future times.



Cloudiness and shadedness in their several forms are in many instances entirely dyehouse faults, although not always so. Where these troubles do occur from this source they come primarily from too rapid exhaustion of color from the dye bath, caused by several conditions, such as too much acid, too sharp a rise to boil, too high a temperature, poor or uneven circulation of heat, and a few minor causes. The ones mentioned, however, are the chief evildoers. As already mentioned, in pre-war times if conditions arose where one or more dyestuffs did not fill the bill and give satisfactory results, the rest of the field was culled over and suitable dyestuffs were picked out. The trouble was thus eliminated, but the fault was not. Owing to the extra stimulus caused by the unbalanced conditions during the war, many of the trouble-making faults have been isolated and are now more thoroughly understood and are under better control.

#### COMPLICATIONS ARISING FROM ILL-WORKING CONDITIONS

The first thing to consider when trying to match any particular shade is to pick colors which will meet all requirements as regards light fastness, alkalies, carbonizing, and any others to which the goods may be subjected at any period of its usefulness. After the possible colors are isolated, the next step is to select a combination which will not only make the proper shade but which will also exhaust from the dye bath in unison. There are times when the requirements cannot be met while adhering strictly to all the above rules. Dyeing then becomes considerably more complicated, and the dyer has to apply colors together which have dissimilar properties. In such circumstances the dyeing must be carried on to favor the poorest dyeing color of the combination, making sure that the latter has nearly exhausted properly before much consideration can be given to the remaining colors in the dye bath. Attention can be given these later on, and exhaustion completed in a proper manner.

Some rather treacherous colors can be made more safe by the addition of slight amounts of alkali, the omission of the acid, or by the exact control of weak acids. Whenever possible the first two methods probably are the safest, but there are times when perfectly good colors are destroyed and their dyeing properties rendered more or less unsatisfactory. At such times a slight addition of some of the weak acids has to be resorted to. Every measure of precaution must then be taken or cloudiness and shadedness, poor penetration, etc., will surely result. To this end the rapidity with which the dye bath is raised to the boil, the rate of exhaustion at any particular temperature, and the rapidity of the boil and evenness of heat distributing, must be thoroughly studied.

#### VARIATIONS OCCURRING IN PIECE DYEING

In piece dyeing it is very important that the dyer know the particular traits of every kettle which he is using. He will, in all probability, notice that, given the same conditions of stock and dyeware, he produces different re-

sults in different kettles. Sometimes this is owing to the operator and sometimes it is not. I dare say many a kettle hand has suffered a reprimand for conditions for which he was entirely blameless. It will be found that there is some underlying heat distribution which is dissimilar to the parallel kettle that causes these different results.

It might be well to mention the producing of different shades from piece to piece which occurs in the same dye solution. Every dyer is aware of this condition and has been, at times, troubled with it. In all probability it is caused more from unevenness of heat, as is the condition of different shades from kettle to kettle, than from any finishing fault which is quite often held responsible. There is a marked tendency for hot solutions in a kettle to form currents, due to radiation and the difference of temperature between the false front and back. These currents are also aided greatly by the agitation caused when steam is admitted. It is reasonable to assume that the liquor entering from the back to the front seeks out the lines of least resistance and continues in the same channels during the dyeing operation, the ingoing hot liquor circulating conversely. The consequence is that the actual dyeing is taking place at different temperatures in relation to the outgoing cooler liquor of the back to the newly heated ingoing liquor from the false front, thus giving several dyeing conditions in the same dye bath. This can be somewhat overcome by the arrangement of the kettle piping for the admission of steam and the changing of the false front to allow more even distribution of heat. The position of the dye reel is also an important factor. It will be found that if the reel is moved forward or backward, different dyeing conditions will result. All these differences should be studied and made to conform with the special problems that arise in any given case.

#### INFLUENCE OF TEMPERATURE ON COLOR ABSORPTION

The next point to consider is the rate of absorption of the dyestuffs in use at any given temperature between cold and boiling. It will be noticed that some colors go on very rapidly once they have reached a given temperature, and but very little up to that point; whereas another dyestuff may be absorbed in direct proportion to the heat admitted. Consider the case, for example, of such a color as the well-known Sulphon Cyanine. In a neutral bath this color has but very little tendency to dye wool at any temperature much below the boil. From 175 Fahr. to 200 Fahr. the color begins to be absorbed, but as the boil is reached this dyestuff is absorbed very rapidly. It is evident in this case that if a rule were laid down to bring a kettle to the boil in a stipulated time, considerable valuable time might be wasted and poor results the only reward, owing to a too rapid exhaustion from overly vigorous boiling after the boil has been reached. It would be far better to come up quite hot in a short period of time, and then spend more time going through the period of exhaustion, which can be regulated at will by the proper admission of steam.

## INDIVIDUAL COLORS MUST BE STUDIED SEPARATELY

Take, for another instance, Super Chrome Blue B, or the same color as known by other names, as dyed either on a chrome bottom or sour-dyed for chrome topping. This color has to be dyed in a weak acid bath and its absorption takes place almost completely from 150 Fahr. to 190 Fahr. After reaching the boil there is rarely more than 20 per cent of the original color still to go on. It is plainly evident that this color is taken up in a very small proportion of time, considering the time elapsed in the whole dyeing operation. If the method used in dyeing Sulphon Cyanine were applied to dyeing Super Chrome Blue B, it can readily be seen that the results could sometimes be unsatisfactory, depending on the difficulty of penetration of the cloth in question. A rule to govern the two cases would be very little better unless considerable time was wasted. Each color must be studied by itself and its properties thoroughly understood and applied as appropriately as possible. There are a number of good colors which get the name of poor dyeing colors, owing to the lack of knowledge of their proper method of application.

## VALUE OF THOROUGH KNOWLEDGE IS GREAT

It is the wish of the writer to bring out the value of as thorough knowledge as one can possibly get of the materials he is working with. All elements which enter into an operation of dyeing are of vital importance, and any or all can cause trouble at times. The one thing that can be played at will and made to yield advantageous results is steam and its distribution while dyeing. The subject of kettle design and steam circulation inside the kettle will not be discussed in detail, as it has been found that what is satisfactory in one instance, or for one line of work, will not be so for another. However, the person who does make a study of these conditions for application in his own case may rest assured that he will be well paid for his efforts.

## HIGH AND LOW STEAM PRESSURE, AND PER CENT VARIATION

Another consideration in regard to steam is variable pressure as it enters the kettle due to overloading of the steam line, and to boiler house faults. This trouble is often quite unsuspected. If using high pressure steam, this variation can be several pounds before it becomes apparent, owing to the small percentage of variation. However, if using low pressure steam, as many mills do, a variation of a pound or two either way makes the per cent variation decidedly more. In consequence the effects produced are sometimes serious, especially where every precaution possible has to be taken to insure the best results. For example, if a kettle had a valve set to come to the boil in a given time a five pounds pressure, and the pressure jumped to seven pounds, or down to three pounds—which is by no means an extraordinary

condition—the reader can figure for himself, on a percentage basis, what would happen. When the absolute control of temperature is so vital, incidents such as these should be given more than passing notice, for one never feels sure just what has happened all through the dyeing operation, even though he has regulated the admission of steam with as much consideration as possible. The steam pressure must be kept constant or some other means of control must be substituted.

There are on the market steam controllers in which the time element has been incorporated which give good results in controlling the steam at any variable pressure and temperature. Their use is a great relief to the dyer, in that he not only controls the steam properly and thereby gets the results he is after, but moreover always knows that this part of the dyeing has been according to stipulation. Therefore, if any trouble should occur on that or any other set so controlled, his mind is positively at rest as far as steam regulation goes. If that has been at fault he can easily make the necessary charges for all succeeding batches. If not, he can look elsewhere.

## ALKALIES IN VAT DYEING

L. Kollmann; *Textilberichte*, 1921, 2, 379; through the "Journal of the Textile Institute."

The leuco compounds are most soluble in strong inorganic alkalies, caustic soda or lime. Dyeing with vat colors is possible when the leuco compound is in complete solution or in a finely dispersed suspension. Such suspensions are obtained by decomposing the soluble vat with sodium bisulphite, bicarbonate, etc., or previous reduction in the presence of weak alkalies. Suspension vats do not give as good results as when a true solution is used. Weak alkaline vats are only required for wool. Concentrated hydrosulphite alone effects very little reduction of indigo; some weak alkali is essential—even calcium carbonate will serve. The author mentions a vat in which zinc oxide or prepared chalk are used as bases—for instance, a vat made as follows: 3 per cent indigo 20 per cent, 15 per cent prepared chalk, 10 per cent hydrosulphite on the weight of wool, in a vat 1:100 on the wool, at a temperature of 75 deg. Cent., in one hour gave a dark blue which was as fast to milling and rubbing as if dyed in an ordinary vat.

## THE IMPORTANCE OF THE ADDITION OF TIN SALTS IN DYEING AND BRIGHTENING ALIZARINE RED

R. Haller; *Textilberichte*, 1921, 2, 427; through the "Journal of the Textile Institute."

The author has previously obtained from colloidal alumina and alizarine a body which differs from that obtained by double decomposition by its pronounced colloidal character. He now finds that on adding a few drops of a very dilute solution of alizarine to a colorless stannic acid hydrosol, shaking and standing, a



faintly opalescent solution of pronounced orange red color is obtained. Further, the calcium-aluminum alizarine lake is capable of adsorbing considerable quantities of this colloidal tin compound with considerable yellowing of shade. On heating a solution of sodium palmitate, stearate or soap with tin salts a stannic acid hydrosol is formed, capable of forming the yellowish colloidal tin alizarine compound. The author gives

the following theory for the action of tin salts. The tin salts added to the soap solution form a small quantity of stannic acid sol, which forms with a small quantity of unaltered alizarine liberated from the cloth, the colloidal tin-alizarine compound of distinct yellowish red color. This is energetically absorbed by the calcium-aluminum lake, and the color changes from a bluish red to the desired fiery scarlet.

## The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture

### Part II

By A. K. JOHNSON, S.B.

*Lowell Textile School*

**"Simple" and "Compound" Microscopes—Varieties of Simple Microscopes—Spherical and Chromatic Aberration—"Virtual" and "Real" Images—Uses of Simple Microscopes—Principles of Construction of Compound Instrument—Binoculars with Paired and Single Objectives—Applications and Accessories—Variation of Magnification**

#### MICROSCOPES AND SOME IMPORTANT ACCESSORIES

A MICROSCOPE is an instrument having for its purpose the formation of an enlarged "image" of a near object. By the use of the microscope the range of human vision may be extended downward through the region of indistinct objects into the realm of the minute and invisible. The normal eye can distinguish lines ruled about 100 to the inch. This represents the lower limit of unaided vision. But, with the use of proper magnifying parts, lines ruled from 100 to 50,000 or 80,000 to the inch may be rendered clearly visible. One may, then, obtain a series of images of an object which show finer and finer detail as the magnification is increased and may derive from them much valuable information. The actual magnifications employed are, of course, selected with regard for the nature and demands of the problem being investigated.

Microscopes comprise a class of instruments. The various individual members of the class present considerable differences in outward appearances and complexity, but can all be placed in one of two groups when judged from the optical principles employed. They are either "simple" or "compound" microscopes. The simplicity of construction and of use, and the effective range of service of the two types, is widely different.

#### SIMPLE MICROSCOPES

Simple microscopes ordinarily consist of a single lens or of one group of lenses which act as a unit. This lens or lens group may be put into almost any form of mechanical holder which possesses special convenience for a particular use and often bears names which tend to show this use. Thus, of the different "glasses" on the market

we find such special forms as the "pick-out glass," so mounted that when placed upon a piece of cloth the lens is in the proper position to give a sharp image. The base of these pick-out glasses often has an opening of a definite size, as one square inch, and the image of the cloth is that of one square inch. There is no need for measuring out one inch when using this microscope [see Fig. VIII, (g.)]. "Watchmakers'" or "engravers'" glasses are so made as to be easily held by the facial muscles around the eye, thus leaving both the operator's hands free for work. "Reading" glasses, "Coddington," tripod" and "pocket" magnifiers, "thermometer readers" and "dissection microscopes" are common names applied to simple microscopes of a given design.

A lens or lens combination may be made to give two kinds of images. One shows the object right side up ("erect"), the other shows it wrong side up ("inverted"). Each type may usually be obtained by making a proper, but different, arrangement of distances between the lenses, the object, and the eye. The erect image is called a "virtual" image, because it can be seen by the eye but not readily shown on a screen or ground glass. The inverted image is called "real" because it can be seen and also thrown upon a screen.

The quality of the image produced by a lens may be impaired because of two troublesome properties of lenses. One trouble tends to produce distortion, giving an untrue representation as to shapes and positions, and is called "spherical distortion" or "spherical aberration." The second trouble tends to produce colored borders and is known as "chromatic aberration." Great care is taken by the reliable makers of microscopes to reduce these troubles as much as possible in any given grade of instrument, and optical parts which have been so corrected bear special names like "aplanatic" where the correction

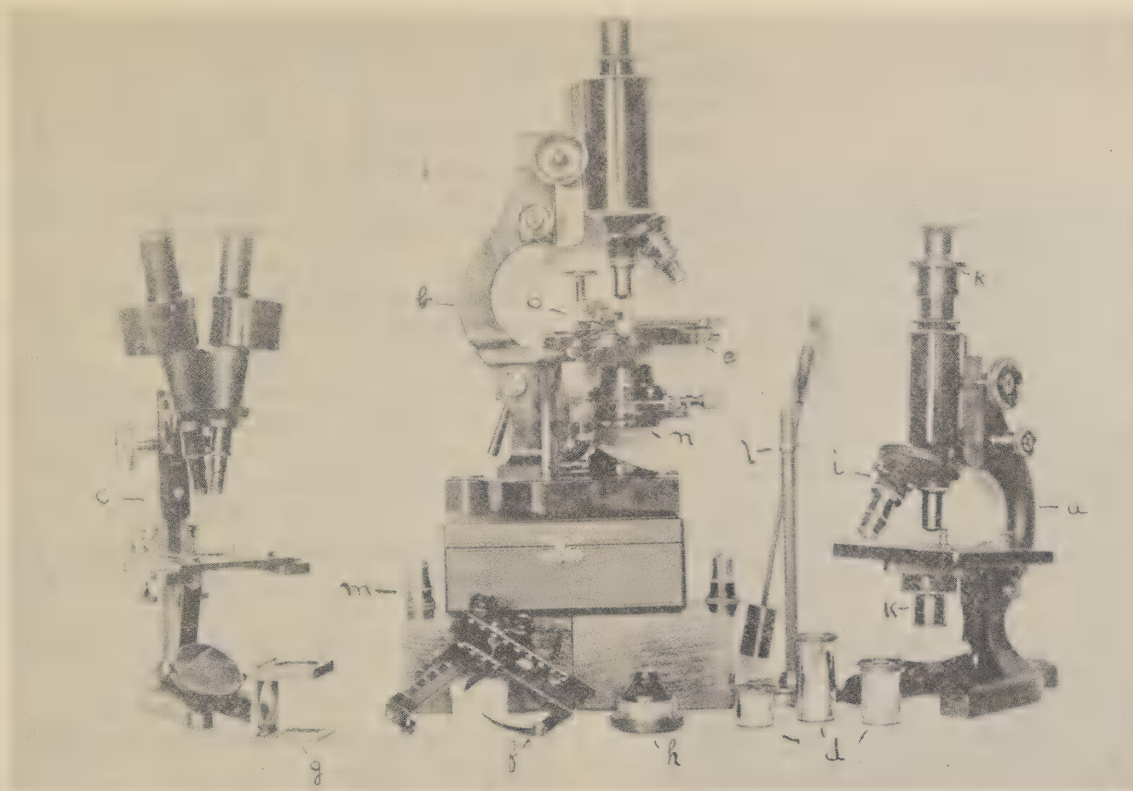


FIG. VIII—Showing a Few Models of Simple and Compound Microscopes and Some of the More Important Accessory Apparatus

(a) An ordinary form of compound microscope having attached to it both a polarizing apparatus (k, k) and a vertical illuminator (i).

(b) Another model having a very complete substage condensing apparatus (n) for intensifying the light, a circular revolving stage (e) and a mechanical stage (o).

(c) A binocular microscope with paired objectives and oculars.

(d) A series of oculars. The shorter the length the higher the magnifying power.

(f) A detached mechanical stage for square-cornered stages as on model (a).

(g) A simple microscope ("pickout glass").

(h) An Abbé condenser, detached. Compare with (n).

(i) A vertical illuminator, attached, for reflecting light downward upon opaque objects like metals.

(l) A mounted bull's-eye condenser to intensify light.

(m) A detached objective.

for spherical distortion is obtained by grinding operations, or "achromatic" or "apochromatic" when chromatic aberration has been reduced to a minimum.

In simple microscopes the virtual image is the one most commonly employed for visual use. It shows the object right side up, as in ordinary life. The simplicity of construction of this form of microscope does not afford opportunity for the makers to overcome chromatic aberration—in powers of magnification over twenty—sufficiently to make the image at higher enlargements a satisfactory one to use. Simple microscopes are therefore usually found furnishing a magnification of under twenty and more frequently at ten or under. They are of "low power." Co-related with their low power they show a relatively large area when in focus; they have a large "field." Further, the free space between the lens and the object is usually large and permits of the use of tools or instruments which can be readily seen. The light needed for the image is easily regulated without special apparatus, and any reasonable movement of the object is not particularly troublesome to the observer. All of these properties of simple microscopes—erect image, low

power of magnification, large area visible with plenty of light easily obtained, the use of the tools permitted, and the possibility of considerable movement in the object—tend to make their use easy and natural. They are extremely serviceable in working operations upon indistinct materials, or in the examination of indistinct crystals, written characters, engravings, abrasions and the like.

#### COMPOUND MICROSCOPES

In order to obtain satisfactory images of much higher magnifications than is practical with the simple microscope, the compound microscope is used. The optical principle of the compound form is much more complex than that of the simple type. It employs two separate groups of lenses, one at a definite distance above the other. [See Fig. IX, (copied from "Use and Care of the Microscope." Bausch & Lomb Optical Company).] The lower group, the "objective," forms an enlarged, real (inverted) image of the object at such a height that the upper group, the "ocular" or "eyepiece," uses this real image as its object and in turn forms an enlarged,



virtual image of it. The final magnification is thus the combined effects of the two groups. By means of this more complicated system the effects of spherical distortion may be reduced to a negligible quantity, and that of

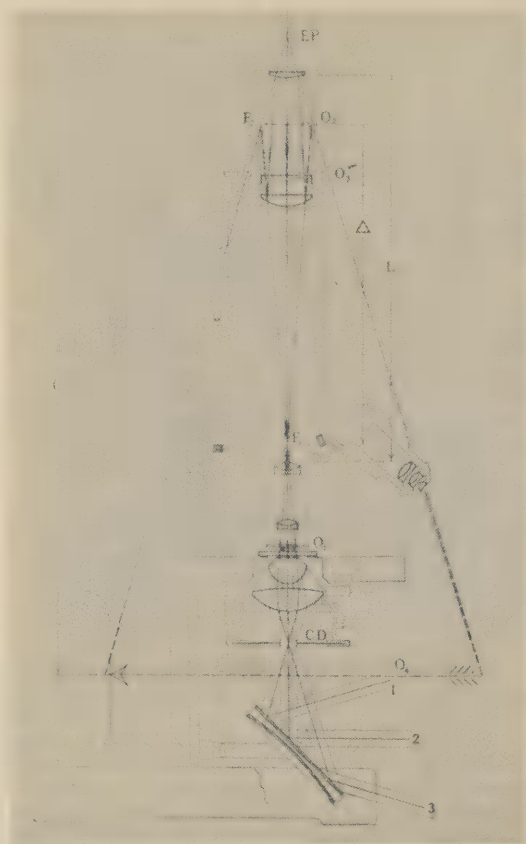


FIG. IX (from Bausch & Lomb Company Pamphlet, "Use and Care of the Microscope")—Showing Optical Effects of Objectives and Oculars. The Construction of Mirrors, Condenser, Objectives and Oculars Is Also Shown.

#### Index to Diagram)

- F<sub>1</sub> Upper focal plane of objective.
- F<sub>2</sub> Lower focal plane of eyepiece.
- Δ Optical tube length=distance between F<sub>1</sub> and F<sub>2</sub>:
- O<sub>1</sub> Object.
- O<sub>2</sub> Real image in F<sub>2</sub>, transposed by the collective lens, to
- O<sub>3</sub> Real image in eyepiece diaphragm.
- O<sub>4</sub> Virtual image formed at the projection distance C, 250 mm from
- EP Eyepoint.
- CD Condenser diaphragm.
- L Mechanical tube length (160 mm).
- 1, 2, 3 Three pencils of parallel light coming from different points of a distant illuminant, for instance, a white cloud, which illuminate three different points of the object.

chromatic aberration to the utmost possible minimum

Compound microscopes may be obtained in two general types, the "binocular" type and the monocular, or ordinary form.

Binocular microscopes have paired oculars so that both eyes may be used at the same time in making the examination. The earlier models also have paired objectives, giving a view of the object from two different directions

(a so-called stereoscopic effect) which is at times an advantage. [See Fig. VIII (c).] These models have a range of magnifying power from 8 to 150. [See Table 1 (from catalogue of Spencer Lens Company).] Later models of binocular instruments do away with the paired objectives. They are "mon-objective." They use the same kinds of objectives that the ordinary form of compound microscope uses and have the same range of magnifying power. The paired oculars are retained, and with them an apparent stereoscopic effect.

The ordinary form of compound microscope is by far more commonly met with. It is made in a wide variety of models which differ mainly in design and quality of parts, and in the style, character, and amount of accessory equipment provided. If the equipment has been chosen to facilitate a certain kind of work, then the model may be given a name implying this use. For example, chemist's microscope, metallurgical, petrographical and biological microscopes, may all use identical kinds of objectives and oculars and have the same ranges of magnifications, but the selection of accessory equipment is made for the more common needs in each field. A chemist's microscope can do metallurgical or biological work if the same kind of equipment is at hand, and vice versa.

TABLE 1

Showing magnifications of binocular microscopes with paired objectives (from Spencer Lens Company catalogue)

Table of Magnification Binocular Microscopes		Oculars							
Paired Objectives	4x	5x	6x	8x	10x	12x	15x	20x	
55 mm.	8	10	12	15	19	22	27	38	
48 mm.	11	12	15	21	25	29	36	58	
40 mm.	13	18	22	27	34	40	51	68	
32 mm.	20	24	29	35	46	52	69	92	
25 mm.	30	37	45	60	74	90	117	148	

The magnification obtainable with a compound microscope for usual use ranges from 8 to 2,200. It may best be varied by using different objectives. Objectives may be "chromatic" (uncorrected), "achromatic," or "apochromatic," the last two having different degrees of correction for chromatic aberration. They may also be "dry" or "immersion," the latter being of the very highest magnifying power and requiring the use of a fluid between the bottom lens and the object. Each objective usually has but one power of magnification, but each one in a series is of different power. [See Table 2 (from Bausch & Lomb Optical Company's catalogue).]

The second best way of varying the magnification is by using different oculars from a series, each one having a higher magnifying power. [See Table 2, and Fig. VIII (d).] The magnification may also be varied by a third way, which consists in changing the distance between the ocular and the objective, for visual use, or by changing the point at which the image is caught upon the camera screen, as in micrographic work. For visual use the distance between the ocular and the objective is ordinarily 166 mm. The figures in the table refer to a "tube length" of 160 mm.

As the power of magnification is increased, the size of the field becomes smaller, the amount of light needed becomes greater and more difficult to supply, the free distances between the objective and the object become very small and the disturbing effect due to uneven motion or differences in levels in the object becomes more unbearable. For these reasons the need for mechanical devices to hold the object steady, to furnish sufficient light for the examination and to furnish this light from the proper direction, and to provide means of making fine adjustments of distances with the microscope proper, as in focusing, becomes more and more urgent. The compound microscope is furnished with these.

The instrument may be divided into two parts, one known as the microscope proper, the other as the "stand." [See Fig. X (from Bausch & Lomb Company).] The microscope proper consists of a body tube with a sliding inner tube ("draw tube") to regulate the distances between the optical parts, the ocular and the objective. These are at either end of the body tube. An accessory "nose piece" permits the fixing of two or three objec-

being used, but with the higher powers and in making fine adjustments, as in measuring objects, it is not altogether feasible to do it in this manner. Much better results can be obtained by using accessory apparatus. Under this heading would come such apparatus as a revolving stage

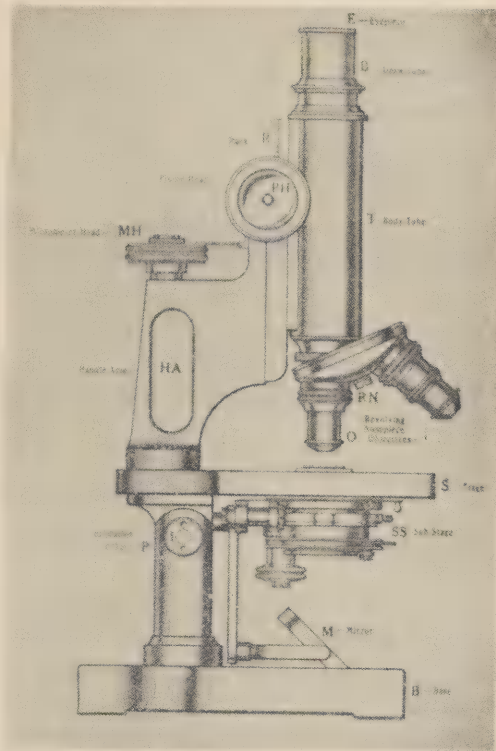


FIG. X (from Bausch & Lomb Company Pamphlet, "Use and Care of the Microscope")—Showing Names and Positions of Parts

which may or may not have a graduated scale showing degrees of rotation. This revolving stage may be permanently fixed or may be of the readily attachable type. [See Fig. VIII (e).] Another device known as a mechanical stage is also attachable and helps greatly in moving the object to and fro across, or forward and back, on the square cornered stages. [See Fig. VIII (f).]

#### 2—Illuminating Apparatus

The intensity and often the direction of light used in microscopic examination may be varied by the use of mirrors or of condensers of the bull's-eye, or Abbe, types [see Fig. VIII (f and h)] by diaphragms or by "vertical illuminators" if the object is opaque and the light must be reflected from the surface. [See Fig. VIII (i).] Special effects are obtained with "dark ground illuminators," with polarizing apparatus [see Fig. VIII (k)], with micro-spectrometers, etc.

#### 3—Measuring Devices

The measurement of the angles in crystalline materials is accomplished with the polarizing apparatus and its

TABLE 2

Showing magnifying powers of objectives and oculars alone and when combined. Also gives, in mm., the diameter of field when instrument is in focus (from Bausch & Lomb Company catalogue.)

Table of Magnifications and Real Fields

Tube length = 160 mm. Projection distance = 250 mm.

Objectives		Eyepieces				
R. P. in millimeters	Initial Magnification	5X	6.4X	7.5X	10X	12.5X
43	2	10X	13X	15X	20X	25X
		10.5 mm	9.0 mm	8.5 mm	8.5 mm	6.8 mm
32	4	20X	26X	30X	40X	50X
		5.5 mm	4.8 mm	4.3 mm	4.4 mm	3.5 mm
16	10	50X	64X	75X	100X	125X
		2.10 mm	1.85 mm	1.70 mm	1.74 mm	1.38 mm
8	20	100X	130X	150X	200X	250X
		1.02 mm	0.90 mm	0.83 mm	0.85 mm	0.67 mm
4	43	215X	275X	320X	430X	500X
		0.48 mm	0.43 mm	0.39 mm	0.40 mm	0.32 mm
3	57	285X	365X	420X	570X	740X
		0.36 mm	0.32 mm	0.29 mm	0.30 mm	0.24 mm
1.9	95	475X	610X	720X	950X	1260X
		0.22 mm	0.19 mm	0.17 mm	0.18 mm	0.14 mm

tives ready for use, which may be brought into use by swinging around the pivot point. The microscope proper is attached to the stand by a rack, by means of which the microscope may also be raised up and lowered.

The stand supports the microscope proper, and supports and includes all the other accessory apparatus, which is attachable to it, needed in holding or manipulating the object, providing the light, and moving or focusing the microscope. The simplest and usual equipment provided with the stand consists of the focusing apparatus for moving the microscope, the stage for holding the object, and a double mirror and an adjustable diaphragm below the stage for regulating the light. [See Fig. VIII (b), also Fig. X.]

#### SOME IMPORTANT ACCESSORY APPARATUS

##### 1—Apparatus for Manipulating Object on Stage

The usual form of stage is square or rectangular. The object may be revolved or moved to and fro by hand when only low or moderate powers of magnification are



parts. Linear measurements showing lengths and diameters are commonly done with glass slides or discs which have fine scales graduated upon them. If these scales are of known dimensions for each optical combination, then the number of divisions which the object covers may be counted and an idea gained as to its exact size. The scales on the slides are used on the stage and are called stage micrometers. The discs are frequently put into the ocular and then are ocular micrometers.

Compound microscopes and their accessories are of good service whenever minute objects are being worked with or where minute detail of structure or arrangement in larger objects is desired to be seen. Much of micro physical and chemical testing, as well as the examination of minute biological products, chemicals, powders, emulsions, yarns, fabrics, rubber, leather and paper goods, is done with the compound microscope.

*(Part III will follow in the next issue.)*

## Modern Views on Soap

### Part III

Tests for Determination of Washing Power—Difficulty of Judging Soaps—Potash vs. Soda Soaps—Solvent Scouring—Dry Cleaning—Note on an Effect of Hard Water—Effect of Time—Ordinary Soaps

*(Continued from page 156.)*

By CHARLES F. GOLDTHWAIT

*Chemist, Klearflax Linen Rug Company, Duluth, Minn.*

#### VOLATILE SOLVENTS IN SCOURING

**S**OLVENT additions to the scour have been rather widely advertised and while the amount used is frequently small and may not exert much actual solvent action on the relatively large amount of oil present, it does have a valuable function in helping to reduce the surface tension and thereby improving penetration.<sup>11</sup> For instance, when the surface tension of water is represented by 80 units, that of water containing soap is about 30, and a suitable solvent still further reduces it. The result is to get behind the dirt more easily and remove it from the goods. Such a solvent can be conveniently added by using one of the proprietary articles made from monopole oil and carbon tetrachloride or similar compounds.

We have now seen that the newer methods of chemistry and physics have brought out a number of ideas on soap that have or are destined to have an important bearing on its use in textile mills. Among the largest users of soap are the manufacturers using animal fibers, particularly wool, with its scouring and fulling. They also are necessarily among the most particular, as a slight degree of alkalinity may do a large amount of damage if the wool is exposed to it under just the right conditions, or soap made from a poor quality fat may make itself very evident later when the goods are taken out of storage, where they have developed a vile odor. Rancid fats often yield poor lathering soaps as well as leaving offensive smells in the fabrics.

In the past, mill men have made many rather dogmatic assertions about the soaps that they have used, and there is no doubt that some chemists have been equally sure of

numerous "things that were not so." Fulling and scouring overseers who have insisted that the purchasing department procure neutral potash soap and who have then proceeded to mix it with relatively large proportions of soda ash before using are now, thanks partly to the war with its potash famine, in a dwindling minority. These men were certainly wrong in ascribing any real virtue to the presence of potash under these conditions. On the other hand, they have been perfectly correct in insisting on the use of certain soaps when the chemist tried to substitute other brands of higher fatty acid content and apparently better money value. Such substitutions have not always been successful, often for reasons that are even yet not well understood. For practical purposes it is still impossible to state positively from any form of laboratory tests just how, for instance, a soap will behave in the fulling mill, or which of two soaps will be best for scouring, unless there is some very obvious difference between them.

Soaps are still largely bought on faith, without any definite quantitative standard of washing power. At least five general methods have been proposed for such a determination based on measurement of some colloidal property, but rapid, accurate methods are still lacking, as well as rules for interpreting the data.

Briefly, the tests that have been proposed are: Comparative washing tests, which are extremely difficult to standardize or control; chemical analysis, which takes no account of colloidal factors; strictly colloidal methods like the protective action toward colloidal gold, or the drop pipette which measures surface tensions; the solubility of soaps or tenacity of jellies of standard strength, which are obviously incomplete; and, finally, a method similar to the hardness test, that measures the amount of

<sup>11</sup> Schofield. J. S. D. C. December, 1921. Page 300.

soap required to obtain a foam under certain standard conditions, and, although crude, is considered the best single test. Here is a wide open field of research for some one with a good supply of patience.

The writer recently experienced a good example of the difficulty of judging soaps. Coconut oil soap is less hydrolyzed than those from most other fats. It would, therefore, be expected to have less action on the skin than the others if used in a toilet soap. Actually, however, it has a more irritating effect than the others, and more than could possibly be due to the alkalinity developed in solution. A liquid soap bought for factory wash-rooms was called too "strong" and was said to affect the hands. It tested well below a Government specification<sup>14</sup> of 0.05 per cent potash as caustic, and alkaline salts equal to 0.30 per cent figured as potassium carbonate. During experiments on the manufacture of a substitute a very "neutral" soap was made from fat containing a rather large proportion of coconut oil. A test showed it well under the above alkali limit, but it felt on the hands as though it contained free caustic. The trouble was evidently due to a specific effect of coconut oil.

Apparently manufacturers of toilet soap containing coconut oil overcome the difficulty by proper blending. Hurst and Simmons<sup>15</sup> also state that more than 25 per cent of coconut oil should not be used in toilet soaps, as a larger amount is liable to irritate sensitive skins. Such a phenomenon would ordinarily be ascribed to the free alkali, and only serves to show how easily one can be misled in the investigation of such complicated materials as soaps.

#### POTASH VS. SODA SOAPS

Tradition says that potash soaps are better for wool than soda soaps. While some authorities consider the matter open to doubt, the fact remains that there are differences in the solutions of the two kinds of soaps. We have all read that hard soaps are made from soda and that soft soaps are made from potash. The writer, however, has had very little respect for this statement since the time when, fresh from school, he reported a certain soap, soft enough for anyone, as containing a certain amount of potash, only to discover later that it was merely a soda soap with an extra large amount of water.

Besides this obvious difference that does apply to the two kinds of soap under comparative conditions, there are more subtle differences. A 5 per cent solution of ordinary soap gelatinizes at the average temperature, while a 20 per cent potash soap will still pour. The sodium soaps become colloidal sooner than the corresponding potassium soaps because the latter are more soluble in water and tend to yield true solutions over higher ranges of soap concentration than the sodium soaps.<sup>1</sup> There are differences in their lathering properties as affected by

temperature and concentration of solution, and we have already mentioned a difference in our discussion of curd fibers. There is, then, a possibility that some of the differences claimed in practical use may have a basis in fact.

Up to the present, however, the reason why soft soaps are better for wool than hard soaps, leaving it with a softer feel and a more silky luster, has not been definitely settled.<sup>15</sup> It has been suggested that the glycerine which is left in the soap during manufacture has some influence, but the usual quantity, about 4 per cent, seems too small to exert any marked effect. That potash soaps are actually any better is doubtful. For example, claimants for success in using potash soaps in scouring have been found to use hard soda soaps for fulling the same goods, which would seem to destroy any previous effect of the potash.

The chances are that their reputation has been built up largely on experiences that are not really comparative. Such an impression might easily be created by the fact that potash soaps are usually made of low melting fats that work well at low temperatures and are so readily soluble at these temperatures that they easily wash out.

#### SOLVENT SCOURING—DRY CLEANING

In the removal of greasy matters by volatile solvents the tendency is for the solvent to take out the grease, but to leave some of the dirt which may be protected by a film of water. This difficulty is overcome, especially in dry cleaning, by dissolving a soap in the solvent. Ordinary soaps are not soluble in such a solvent, but a special oleate soap containing an excess of free acid is readily taken up, also some of the metallic soaps like magnesium. The explanation of this action has been recently given.<sup>2</sup> The solvent itself dissolves the grease and oil in the ordinary way, but the moisture which all textiles contain must be emulsified before the non-greasy dirt can be removed. A pure solvent will dissolve small amounts of it and carry larger amounts in suspension. In the presence of benzine soap this takes place more easily; the soap attracts the water and readily emulsifies it, carrying away the dirt at the same time. With ordinary soap it is emulsion of oil and dirt in water, and with benzine soap an emulsion of water in a solvent.

#### AN EFFECT OF HARD WATER

While a discussion of water softening and hard water hardly belongs in this review, a recent observation<sup>16</sup> is of rather special interest. All discussions of water softening harp on the fact that lime and magnesium salts in water cause a great waste of soap. This is granted without further discussion, but a point about which we hear less may be of some interest, namely, the attraction of the insoluble calcium and magnesium soaps to the washed

<sup>1</sup> Fischer. "Soaps and Proteins." Wiley, 1921.

<sup>14</sup> Bureau of Standards Circular 62. "Specifications for and Methods of Testing Soaps."

<sup>15</sup> Hurst and Simmons. "Textile Soaps and Oils." 1921. Page 90.

<sup>2</sup> Darke, McBain and Salmon. Proceedings of the Royal Society. March 3, 1921. "The Ultramicroscopic Structure of Soaps."

<sup>16</sup> Chemical Abstracts. Vol. 15, 2992.



goods. It is stated that new shirts contain  $\frac{1}{2}$  to 3 per cent ash, while old ones run from 7 to nearly 9 per cent, a sufficient difference to be quite convincing.

#### EFFECT OF TIME

The chemist who thinks in terms of ordinary chemical reactions is apt to underestimate the value of the factor, time, which is one of the most significant in treating colloids. It is of particular importance in making soap and perhaps in using it. Storing a cold, clear transparent solution of red oil soap and finding a white opaque mass after a few days shows clearly that time produces changes in soap masses.

A matter like the boiling of a fulling soap for a long period after solution is apparently complete does not seem necessary, but, like many other empirically established ideas, it may find a justification in practice and an ultimate explanation in colloid chemistry even though contrary to ordinary chemical notions.

#### ORDINARY SOAPS

Having considered soaps made from pure fatty acids and some soaps prepared for special purposes, a few notes on ordinary soaps may not be out of order. Good red oil can be actually made into a soap about as easily as harder soap can be merely *dissolved*, and for many purposes its cleansing action is better. It is well known that ordinary tallow soap is very much improved from the washing point of view by the use of 5 or 10 per cent of cocoanut oil in its manufacture.

Ordinary soaps are mixtures, and usually contain a little of each of the ordinary fatty acids. McBain says that commercial sodium soaps contain as sole structural constituent, hydrated curd fibers, with enmeshed liquor which is a sol, or more frequently a gel, of the various more soluble soaps and salts present, while Fischer states that the ordinary bar of pure soap is essentially only a solid "solution" of water in a mixture of sodium soaps. When used, the more readily soluble come out first, thus favoring disintegration of the bar for the production of the hydrated liquid colloid required for washing.

In this way the soap will answer all ordinary requirements. Soaps of the lower fatty acids assist in foaming and emulsifying quickly at low temperatures. They dissolve quickly, however, and are liable to be wasted, as in warm water they pass into true solution. Soaps from the fatty acids from the middle of the series now become effective. These in turn lose some of their virtues if the temperature is raised, but as the boil is approached the soaps of the higher fatty acids like palmitic and stearic are most effective. A soap can therefore be made for a special purpose or, though less economically, for almost universal use.

Much further work on soap is under way by different investigators, and a Part II of the "Colloidal Chemistry of Soap" is promised for a future British Association Report. When it appears, it can be counted upon as one of the most authentic sources of the very latest information. More familiarity with such work and more interest in it will hasten the time when we shall all thoroughly understand the soaps that we use every day.

[THE END]

## The Effect of Scouring and Bleaching Upon the Structure and Strength of Cotton Fabrics

Delivered Before the Manchester Section of the Society of Dyers and Colourists, and Printed in the Journal of the Society

By J. HUEBNER, M.Sc.Tech., F.I.C.

THE methods of scouring cotton fabrics employed in the industry differ materially, and, since no exact data were available as regards the loss in weight and the effect of different processes upon the strength and the structure of the fabrics, a number of scouring experiments were carried out in order to ascertain the effect of steeping, malting and of different methods of boiling.

It was found that the following process produces the greatest freedom of the scoured fabric from oils, fats, starches and other ingredients used in sizing the warp, with the least reduction in its strength:

1. Steep.—Run the cloth into the open kier and boil lightly overnight with 1 per cent of soda ash.
2. Run out of the kier, through rope washing machine, back into the kier.
3. First Boil.—Boil for about  $12\frac{1}{2}$  hours in the open kier with  $1\frac{1}{2}$  per cent of caustic soda and  $1\frac{1}{2}$  per cent of soda ash.
4. Run out of the kier through rope washing machine.
5. Sour with  $1\frac{1}{2}$  deg. Tw. hydrochloric acid.
6. Run through the rope washing machine back into the kier.
7. Second Boil.—Boil in the open kier for about  $12\frac{1}{2}$  hours with 3 per cent of soda ash.
9. Pass through water mangle.
10. Dry on the cylinders.
8. Run through the rope washing machine until free from soda (usually four times).

11. Impregnate with a solution of sodium acetate in the water mangle.
12. Stenter and dry on clip stenter.
13. Damp slightly.
14. Plait and measure.

The impregnation with sodium acetate (11) was carried out in order to counteract any acid which might be liberated in processes through which the fabrics had to pass later on. It was found that this did not affect the strength or the properties of the fabrics under consideration.

Four types of fabric (I, II, III and IV) were first examined and the investigation was then extended to a fabric woven from finer yarns (V) scoured by the above process, and to five fabrics (VI to X) which have passed through different processes or boiling and bleaching in order to ascertain the effect of other methods of boiling, as well as that of bleaching, and to obtain a comparison between the changes produced by the special method of scouring and the methods commonly used in a bleach works.

It is proposed to deal first with the differences between the gray and the scoured fabrics, and later on with the changes which have taken place in each of the different operations.

In order to appreciate the effect of scouring on the number of warp and weft threads per inch (ends and picks), it should be pointed out that the number of warp threads in any one piece cannot vary greatly, because the weaving reed strictly spaces them. The difference never exceeds two threads, and rarely exceeds one thread to an inch, which is negligible. The variations are, however, considerable when one piece is compared with another piece of the same quality.

The following table gives the number of warp threads per inch found in the four qualities tested:

	Highest.	Lowest.	Mean of all the Samples Tested.
I. ... ..	137	121	127.6
II. ... ..	130	115	122.0
III. ... ..	144	122	130.0
IV. ... ..	136	120	128.3

The number of weft threads per inch varies (a) in a single piece and (b) in different pieces of the same quality. The former is due to defective weaving, the latter to irregular structure.

The variations in the number of weft threads per inch found in pieces in the loom state are:

	Greatest Variation.	Least Variation.
I. ... ..	12 (136 to 124)	0 (127 to 127)
II. ... ..	7 (115 to 108)	1 (115 to 114)
III. ... ..	12 (133 to 127)	0 (130 to 130)
IV. ... ..	8 (151 to 143)	0 (132 to 132)

As will be seen from the following table, the variation in the number of weft threads per inch in different pieces of scoured fabrics is considerably greater than in the loom state:

	Highest.	Lowest.	Mean.
I. ... ..	125.6	108.6	122.0
II. ... ..	124.2	102.2	114.1
III. ... ..	141.0	120.4	126.1
IV. ... ..	145.0	125.6	136.1

The scouring is responsible for an increase in the number of warp threads per inch and a decrease in the number of weft threads per inch, because as a rule the length of a fabric increases during scouring, while its width decreases.

		INCREASE IN WARP THREADS PER INCH.			DECREASE IN WEFT THREADS PER INCH.		
		Maxi- mum.	Mini- mum.	Mean.	Maxi- mum.	Mini- mum.	Mean.
I. ... ..	...	8	1	5.4	11.0	1.0	4.1
II. ... ..	...	8	1	4.9	16.8	0.6	5.0
III. ... ..	...	7	1	4.9	12.0	0.6	4.2
IV. ... ..	...	8	1	5.5	8.8	0.6	4.2

It has been found that attempts to stenter the scoured fabric to its gray width invariably result in reducing its tensile strain weft way.

Experiments have, therefore, been carried out in order to ascertain the width to which each type of fabric may be stretched out on the stenter without reducing its tensile strain in the weft way appreciably.

The results are as follows:

		Gray.	Scoured.
		In.	In.
I. ... ..	...	44.47	42.50
II. ... ..	...	43.96	42.13
III. ... ..	...	43.95	42.13
IV. ... ..	...	43.91	41.25

The shrinkage in the case of IV, the finest fabric, is greater than in the heavier fabrics I, II and III. In order to obtain the most satisfactory result as regards tensile strength in the weft way it will, therefore be necessary to make allowance for this in the construction of these fabrics.

Valuable information in regard to the changes which occur in a fabric during scouring may be obtained by ascertaining the regain in the warp and weft. This is the difference between the length of a fabric and the length of a thread when removed from that fabric.

The regain may be an indication of good or bad weaving, for if the regain in the warp and in the weft of a scoured plain fabric is not the same the elasticity of the fabric will differ in the two directions. If the



regain in the warp exceeds greatly that in the weft, it may be assumed that during weaving the tension upon the warp was insufficient. If, on the other hand, the regain in the weft greatly exceeds that in the warp, it may be taken that the tension on the warp during weaving has been excessive.

The mean changes in regain in all the samples tested are as follows:

		WARP.		WEFT.	
		Grey.	Scoured.	Grey.	Scoured.
I.	...	17.9	13.2	7.8	10.9
II.	...	12.6	10.2	7.2	10.5
III.	...	14.4	7.4	7.8	10.7
IV.	...	8.4	5.4	8.2	11.4

The mean changes in regain, in per cent, effected by scouring are:

		Warp.	Weft.
I.	...	-26.03	+39.7
II.	...	-19.05	+45.8
III.	...	-48.61	+37.2
IV.	...	-35.72	+38.8

It will be noticed that in each quality the difference between the regain of a gray and a scoured fabric is considerable. The regains in warp and weft in the gray fabric are entirely due to the conditions which obtained in the loom. The difference is greatest in I. It becomes less in II and in III, while it is nearly equal in IV.

These conditions are reversed in the case of the scoured fabrics.

The loss in tensile strain and the change in elongation, or stretch, at the breaking point due to scouring of fabrics I to IV is given in the following tables:

#### TENSILE STRAIN (2 IN. STRIPS)

##### WOVEN FROM SINGLE YARNS.

		WARP.			WEFT.		
		Grey.	Scoured	Loss in	Grey.	Scoured	Loss in
		Lbs.	Lbs.	%	Lbs.	Lbs.	%
I.	...	149.00	142.0	4.69	160.9	146.2	9.13
II.	...	129.73	120.3	7.26	132.6	121.1	8.67
III.	...	95.90	89.9	6.25	100.0	88.0	12.00
IV.	...	76.10	70.3	7.62	80.1	71.4	10.86

##### WOVEN FROM FOLDED YARNS

III.	...	98.10	93.6	4.58	108.2	93.6	13.49
IV.	...	80.00	77.8	2.75	75.6	70.3	7.01

It will be noticed that the loss in tensile strain in the warp way is least in the heaviest fabric, I, woven from the coarsest yarn, and that it is less in pieces woven from folded yarns than in pieces woven from single yarns.

#### ELONGATION.

##### WOVEN FROM SINGLE YARNS.

		WARP.			WEFT.		
		High-est.	Low-est.	Mean.	High-est.	Low-est.	Mean.
I.	Grey	26.7	17.0	22.1	15.1	9.2	10.9
I.	Scoured	22.6	14.2	16.8	19.0	13.4	15.9
II.	Grey	22.2	12.0	18.4	13.3	9.8	11.2
II.	Scoured	17.6	12.0	14.2	17.8	12.0	15.4
III.	Grey	20.9	10.0	14.1	12.3	6.4	10.7
III.	Scoured	14.0	8.0	10.3	16.3	10.3	14.8
IV.	Grey	15.2	8.4	11.1	13.4	8.9	10.7
IV.	Scoured	9.6	6.2	7.4	17.8	9.8	15.1

##### WOVEN FROM FOLDED YARNS.

III.	Grey	17.8	12.2	15.3	9.5	6.4	7.7
III.	Scoured	14.0	8.9	12.2	14.0	10.3	11.8
IV.	Grey	14.2	12.3	13.0	8.3	5.8	6.8
IV.	Scoured	10.3	9.6	9.9	9.4	8.2	8.8

The mean loss or gain in the elongation at the breaking point of the fabrics, in per cent, is therefore as follows:

##### WOVEN FROM SINGLE YARNS.

		Warp.	Weft.
I.	...	-24.0%	+45.8%
II.	...	-22.8%	+37.5%
III.	...	-27.0%	+38.3%
IV.	...	-33.3%	+41.1%

##### WOVEN FROM FOLDED YARNS.

III.	...	-20.4%	+53.2%
IV.	...	-24.0%	+29.7%

When considering the total loss of weight, in per cent, which results from scouring, it should be pointed out that manufacturers were instructed to use the smallest possible amount of size. The total losses in weight are, therefore, comparatively speaking, small. They are as follows:

I.	10.15%
II.	11.08%
III.	10.86%
IV.	10.15%

If we now calculate the mean reduction in tensile strain from the data given above, by adding the tensile strain of warp and weft, and by dividing by two, we obtain the following results:

I.	6.93%
II.	7.98%
III.	9.13%
IV.	9.25%

A comparison of the mean tensile strain with the  
(Continued on page 199.)

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

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Lowell Textile School, Lowell, Mass.

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## MEETING AT BOSTON FOR ORGANIZATION OF A LOCAL SECTION

About fifty members of the Society, residing in Boston and neighboring cities, met at the Engineers Club on March 4 for the purpose of organizing a local Section. This meeting was authorized by the Council after consideration of a petition for such Section received by them in accordance with the provisions of the Constitution and By-laws for the formation of local Sections. Winthrop C. Durfee, who had been appointed Secretary pro tem. by the Council and authorized to proceed with the organization of this Section, was in charge until after the election of officers had been completed.

The meeting opened with a dinner at 5.30, followed by the business session at 6.30 p. m., with Mr. Durfee in the chair. After brief remarks by the Chairman, in which he outlined the business of the meeting, it was moved by Mr. Moorhouse, and voted, that the Chair appoint a nominating committee who should present a list of names for officers for the ensuing year. This nominating committee, consisting of William D. Livermore, Chairman; George A. Moran, and Prof. Louis A. Olney, later recommended the following names for officers:

Chairman—Hugh Christison, Chemist, Arlington Mills, Lawrence, Mass.  
Vice-Chairman—Miles R. Moffatt, Chemist, Amoskeag Mfg. Co., Manchester, N. H.

Secretary—Arthur K. Johnson, Chemist, Lowell Textile School, Lowell, Mass.

Members of Executive Committee—John F. Bannan, Chemist, M. T. Stevens & Sons Co., North Andover, Mass.; Frank E. Johnson, Dyer, Wood Mills, Lawrence, Mass.; Leverett N. Putnam, Dyer, Arlington Mills, Lawrence, Mass.; Harry K. Davies, I. Levinstein & Co., Boston, Mass.; Warren H. Whitehill, Chemist, Brightwood Mfg. Co., North Andover, Mass.

An election followed in which all mentioned above were unanimously chosen.

Upon the election of Mr. Christison as Chairman, Mr. Durfee relinquished the chair and the business was carried on in regular fashion with continued enthusiasm.

Among the items of business transacted were the following:

1. Selection of name for the Section.
2. Statement of season for holding meetings.
3. Number of meetings in year.
4. Place and time of meetings.
5. Suggestions as to character of meetings.

Various names for the Section were proposed, such as "Eastern, Mass.," "North Eastern," "Northern New England," and good discussion followed. Much interest was shown in the names North Eastern and Northern New England, and the latter was finally adopted by a large majority. The Section will be officially known as the Northern New England Section.

Mr. Davies moved that the season for regular meetings fall between September 1 and April 30. This motion was seconded by Mr. Moorhouse and carried.

The question as to frequency of meetings was also given considerable discussion. Prof. Olney recommended not over six nor less than four. Mr. Livermore finally moved that the Section meet every other month, within the season, until such time as the Section should vote otherwise. This motion was seconded by Mr. Moorhouse and passed by the Section.

The place of meeting was left to the discretion of the Executive Committee, following the acceptance of a motion to that effect made by Mr. Moorhouse and seconded by C. K. Hannah.

The Section expressed a preference for early Saturday evening as the time of regular meetings, with the expressed proviso that when meetings are to be held in Boston the time should be not earlier than 4 p. m. The time of meetings in other cities was left for appointment to the Executive Committee.



Alexander Morrison, Winthrop C. Durfee and H. K. Davies were prominent in this discussion.

Following these matters of business a general discussion as to the character of the meetings which were to be held was participated in and many suggestions were made as to topics which ought to prove of interest and value to all of the members of the Section.

Mr. Livermore favored short papers by several members, followed by general discussion. His suggestion of an "experience meeting" on the topic "Shady Goods" was well received. Other suggestions were: (1) "Air Conditioning and Its Relation to Drying, Carbonizing and Uneven Dyeings"; (2) "The Effects of Design Upon Properties of Fabrics"; (3) "The Properties of Fibers, Especially Wool"; (4) "The Measurement of Color Values, as by Colorimeters"; (5) "Testing the Fastness of Dyes by Artificial Lights."

Prof. Olney pointed out the fact that the responsibility for the success of the Section rested upon the activity of the individual members and the interest which they took. He spoke of the valuable work accomplished by certain other associations through co-operation among their members, and mentioned the Laundry Owners' National Association as having raised during the past year several hundred thousand dollars for research work and the development of the technical and scientific side of their business.

He also emphasized the need for individual members to prepare short papers for publication in the Proceedings of the Society, along lines suggested by themselves and their own experience. He believed that it would probably be profitable in many cases to have these papers presented before the Section and discussed, and then both papers and discussions published together later.

The meeting was adjourned at 8 p. m.

Following the adjournment of the Section, Chairman Christison arranged for a meeting of the Executive Committee to be held in the Lawrence (Mass.) Y. M. C. A. on Monday, March 13, at 4 p. m.

A. K. JOHNSON, Secretary.

### RHODE ISLAND SECTION MEETING

The next meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists will be held at the rooms of the Providence Engineering Society, 29 Waterman Street, Providence, R. I., on Friday evening, March 24, 1922, and will be a joint meeting with the Rhode Island Section of the American Chemical Society. William H. Adams, manager of the Eastern Finishing Works, Kenyon, R. I., will speak on "Mildewproofing and Waterproofing of Textile Fabrics."

F. C. CUSHING, Secretary.

### WATER PURIFICATION FOR TEXTILE PURPOSES

[Abstract of an address delivered before the Rhode Island Section of the American Association of Textile Chemists and Colorists, February 17, by Robert Spurr Weston, Consulting Engineer, of Boston, Mass.]

The speaker introduced his subject by pointing out that the majority of the bleaching and dyeing establishments of the country are to be found in a comparatively narrow strip of that glaciated region ranging from the neighborhood of Philadelphia to Maine, where there is an abundant supply of naturally good water of good quality. Now, however, conditions are changing. With the aid of modern knowledge of water purification and softening it is possible to supply mills in the South with water eminently suitable for textile purposes at a comparatively low cost, thus neutralizing another of the principal natural advantages which in the past have helped to center this industry in New England.

The speaker enumerated the characteristics of water which affect its suitability for textile work, as follows:

Color	}	Hardness
Turbidity		
Mineral Matter		
Organic Matter		
		Iron
		Manganese

*Color* is defined as a soluble vegetable stain, visible by transmitted light. Color is usually measured by comparing the intensity of color in the sample with that of a solution containing known amounts of a standard coloring body, a platinum-cobalt compound. The color of typical filtered waters in New England ranges from 12 to 30 parts per million.

*Turbidity* is due to suspended matter which interferes with the passage of light. Turbidity is determined by matching the opacity of the sample with that of standard suspensions containing known amounts of infusorial earth. In New England, turbidity is usually due to suspended organisms, the water of Newport often offering a remarkable example of this phenomenon. In general the turbidity of New England waters is low, ranging from 5 to 50 parts per million.

*Mineral matter* ordinarily consists of various soluble lime and magnesium salts, grouped together under the general term of "hardness"; as well as soluble salts of iron and manganese. Surface waters of New England are generally low in mineral matter, therefore soft; but well waters are apt to be hard and frequently contain considerable iron, which is particularly troublesome in bleaching and dyeing operations.

*Organic matter* usually consists of vegetable ooze and algae, which exist naturally to a greater or less

extent in stored and surface water. Water of swampy origin frequently contains organic material which closely resembles an acid dye. This is fixed on the textile fibers by traces of iron, and is extremely troublesome.

For bleaching of cotton, clear, soft water free from iron is the ideal condition. Ordinarily color is not important, because in the bleaching operations it is destroyed. For ordinary cotton work a moderate hardness is not a serious drawback, except where it is necessary to use soap; for mercerized and fine yarns, however, soft water is desirable, and for the animal fibers very necessary. The speaker called attention to the fact that many mills in the New England district are now using fuel oil, and emphasized the danger of allowing fuel oil waste to get into the water and cause trouble in the plants down-stream. Much serious damage has already been caused by this practice.

In dyeing of light clear shades, soft water is a distinct advantage, particularly where soap is used. Moreover, most basic colors form distinct precipitates with hard water, and certain of the direct or substantive colors also are adversely affected by moderate hardness. Of course, mordant colors are frequently helped by hard and iron-bearing water, but as the amount of these impurities varies from day to day the effect is uncertain and unreliable. Many textile plants furnish their dyehouses with condensed water, so important do they regard the necessity of pure soft water for dyeing.

Woolens show a distinctly greater need for soft water than does cotton; in fact, in the case of woolens the improvement obtained by treating a water of as low hardness as 50 parts per million is readily noticeable. In woolen practice highly colored water is also a great drawback. In one case the reduction of color from 50 parts to 10 parts per million resulted in an increase in value of the product amounting to \$10,000 in three months, or several times the cost of the treating plant.

Filtration is accomplished by straining the water through sand, with a preliminary treatment or "coagulation" if necessary. Filters are divided into two general types: slow sand and mechanical filters. The slow sand type is large in area and uses a comparatively slow rate of filtration per unit area. This type does not require frequent cleaning, and is largely used for municipal filtration where a very pure effluent of low bacteriological content is desired. The mechanical filters, which are almost universally used for industrial work, are relatively small in area, have a rapid rate of filtration, and require frequent washing.

Mechanical filters are further divided into pressure and gravity types. The pressure filters are of closed metal construction, usually cylindrical in shape, and

connected together in groups, each group having a common hydraulic pressure in all its units. In them the water is forced under pump pressure through the sand and gravel layer, and collected in the purified condition at the bottom in a system of piping common to the entire group. Gravity filters are of an open tank shaped construction made largely in the past of wood, now frequently of metal or concrete. Water is introduced on top of the sand layer and flows by gravity through the sand and gravel to a collecting system of piping at the bottom.

Both types require washing of the sand layer with a frequency depending on the amount and nature of the material being screened out. Washing is accomplished by cutting out the filter from the supply and delivery systems and reversing the direction of passage of the water. During the washing the sand layer must be agitated. This is accomplished in the newer types by having the wash water of sufficient pressure to lift and agitate the sand by its own velocity. In the older types, agitation is secured by moving rakes or the passage of compressed air from a system of nipples in the bottom of the filter. Regardless of the method of agitation, the dirty wash water is trapped from the top of the sand by a separate system of piping and discharged into the sewer or waste water.

In general, gravity filters are preferable to the pressure type, although the latter is cheaper. The gravity filter is open, therefore always subject to inspection, is easily regulated, and each filter, being independent of the remainder of the battery, can be regulated to take its proper share of the work. The even cross-sectional area makes the drainage and filtering areas equal; moreover, the washing of one filter does not interfere with the operation of the others. The pressure filters are closed and cannot be inspected during operation; they also have a much greater tendency to force the "flock" or precipitate through the sand. Due to the cylindrical shape, they have unequal drainage and filter areas, and, being connected to a common hydraulic pressure system, when one is thrown out for washing the operation of the remainder of the battery is disturbed.

"Coagulation" as a treatment preliminary to filtration is necessary where the water is highly colored or turbid or the suspended matter is in such a fine state of division that it would pass through the sand layer of the filters. "Coagulation" is the technical name for the production, in the water, of a flocculent precipitate, usually aluminium hydrate (sometimes iron hydrate), which in the colloidal state immediately preceding precipitation adsorbs and entraps the coloring matter and turbidity, retaining these impurities when the suspended hydrate is screened out by the filters.

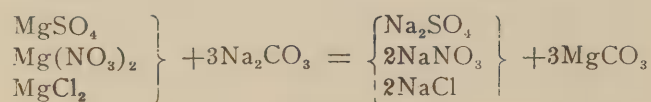
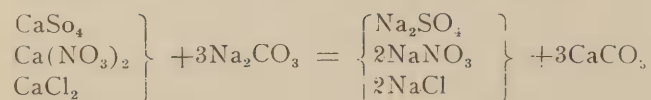
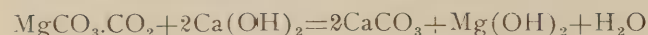
Sulphate of aluminium, which is almost universally



used as a coagulant, is introduced into the water either in the finely divided state or in solution, at a rate sufficient to produce the necessary amount of precipitated hydrate. When the water has sufficient natural alkalinity to precipitate the required amount of alum, no alkali is added; frequently, however, it is necessary to add alkali, usually in the form of sodium carbonate. The reaction between the alum and alkali is a slow one, therefore great care must be taken that the reaction is complete before the water reaches the filter, or precipitation may take place after the water has passed on into the plant. It is true that the frictional resistance caused by the passage of the water through the sand tends to complete the precipitation, but this effect constitutes the last line of defense against the carrying of unprecipitated alum through the filter and cannot be always depended on.

An excess of alkali, which causes re-solution of the coagulant and color, must be avoided. In practice it is found that less than half the chemical equivalent of alkali is necessary to precipitate the alum. The rapidity of formation of the alum precipitate varies with the character of the water, hard waters usually giving a rapid coagulation and soft waters a much slower one. To allow a sufficient time for the reaction at all times most plants are equipped with reaction or coagulation basins immediately preceding the filters, where the water is detained until the reaction between the alum and alkali is complete. For the soft New England waters this detention period should be from two to four hours.

Water softening is usually accomplished by one or the other of two general processes: the so-called "lime and soda" process, developed seventy-five years ago by Dr. Clark, and the "zeolite" process, which is fifteen years old. The lime-soda process consists in treating the hard water with milk of lime and soda ash. Lime and magnesium carbonates, held in solution by carbonic acid, are transposed into the insoluble carbonates by the milk of lime. Soluble salts of calcium and magnesium are transposed into soluble sodium salts by the soda ash, and the lime and magnesium are precipitated as carbonates. The reactions of this process are given below:



The lime-soda method is capable of reducing hard waters to a hardness of from 50 to 60 parts per million, and has the advantage of cheapness.

The newer zeolite processes are based on the fact that certain naturally occurring and artificial silicates have the power of substituting sodium for calcium and magnesium when brought into contact with salts of these metals in hard waters. The water, which must be extremely free of turbidity, iron and organic matter, is simply passed through a bed of the zeolite, which substitutes sodium for the lime and magnesium it contains. Periodically the zeolite is regenerated by treating with a strong solution of sodium chloride, when the reverse process takes place and the original sodium content of the silicate is restored. The zeolite process is capable of reducing hard waters to zero hardness, which is desirable for some grades of work.

In conclusion, the speaker emphasized the economic side of the question of water purification and urged that a thorough study of the particular purification problem and the available water supply be made before any actual construction is undertaken.

#### RHODE ISLAND MEETING OF A. C. S.

The regular meeting of the Rhode Island Section of the American Chemical Society was held Friday evening, February 24, at the rooms of the Providence Engineering Society. Prof. Louis A. Olney was the speaker of the evening, and as an invitation had been extended to the members of the Rhode Island Section of the Association of Textile Chemists and Colorists, the occasion took the form of a joint meeting.

Prof. Olney's talk was chiefly in regard to certain relations which exist between the constitution or structure of dyes, and the properties and methods of application.

With charts, samples and a liberal use of the blackboard he pointed out the fact, so frequently overlooked, that in spite of the custom of dye users to follow one classification based on properties, and of color chemists and manufacturers to follow another based on chemical structure and the presence of certain chromophorous groups, the two different classifications are, after all, very closely related to each other in many respects.

In many instances certain characteristics of composition determine almost invariably the properties of a dye and the method which must be used in its application. In other instances a comparatively slight change in the composition of a dye will completely change its properties and throw it into an entirely different group of dyes as far as method of application is concerned.

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

*Advisory Editor*

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## WHAT DOES SENATOR KING WANT?

**A**FTER many days devoted to the taking of testimony, briefs, assertions, statements, charges, counter-charges and sundry declarations and cross-questionings, the King dye investigation, as it was inevitably bound to do, is at last beginning to assume sufficiently definite shape to permit of its real status being appraised. And a careful appraisal of its status, as an investigation, would seem to indicate at the present writing that it is not going to produce the resounding detonation in dye or other circles which was so confidently predicted by its instigator last year.

Judging solely from the published reports of the proceedings thus far, it is the view of many that the element which for the sake of convenience may be referred to as the prosecution, has shown a striking lack of the threatened fury in its attack—has, in fact, given a very definite impression of having decidedly “hailed in its horns”; whereas the element which for want of a better term may be designated as the defense, has not been shaken from its original position.

This result—and more particularly, the mildness of the prosecution—was foreseen almost from the very day that Senator Frelinghuysen metamorphosed the King dart into a potential boomerang. There were many who upon that occasion agreed that whether the Utah Senator really expected to reveal and prove the existence of a dye monopoly, or whether he merely hoped to derive whatever political capital might accrue from getting the industry under fire, Senator Frelinghuysen had in any case taken all the fun out of the game by lining up the King supporters alongside the target, where they would be in imminent danger of injury from shafts too sharply pointed or too vigorously propelled. Some such thought may have been in the mind of Senator Ashurst when, on resigning from the committee, he characterized the amended King resolution as “a flaccid, denatured, disembowled

affair—a resolution with clipped claws and drawn teeth.”

It is entirely possible, of course, that the investigation may yet produce the promised sensation. But if its distinguished promulgator cherishes any hope of this, he masks it well under his latest attitude toward the affair, which is puzzling, to say the least.

The details of what has transpired have been available to the reader through the daily press in the form of a “close-up.” We invite him for the present to a consideration of the view from a little distance, so as to obtain a better perspective of the broader masses.

Throughout the opening days the Utah Senator maintained the floor practically to the exclusion of all others. Some did speak, it is true, and there was some questioning, but in the main Senator King held steadily on as the chief actor in the drama of denunciation. He was not under oath, and, thus unhampered, he attacked the Textile Alliance, the Chemical Foundation and the American Dyes Institute. He attacked the Chemical Warfare Service and in turn the conduct of Alien Property Custodians Mitchell and Garvan. He said the Du Ponts were “destroyers of industry.” He produced a chart, pointed to a line running from a square marked “Alien Property Custodian’s Office” to another labeled “Chemical Foundation,” and said this showed how Francis P. Garvan had become president of the Foundation—a bit of subtle reasoning which at once cleared away what has hitherto, of course, been an impenetrable mystery, and which was enjoyed by his auditors, no doubt, to the utmost, for various and possibly conflicting reasons.

However that may be, Senator King was given every chance to say all that he might have in mind, and when he was through, and Mr. Garvan was permitted to testify in reply, he listened until he could apparently restrain his impatience no longer, and then demanded to know whether “the subcommittee was really a body charged with the purpose of investigating and probing charges of monopoly, graft, lobbying, etc.,” or “rather a committee with the sole purpose of giving Francis P. Garvan and other gentlemen in the dye and chemical business an opportunity to make speeches and plead for protection for their industry?”

Continuing, he said: “It is evident that the so-called probe is becoming nothing more than a committee for the purpose of listening to speeches. The witnesses are permitted to make statements and place in the records balance sheets, records, etc., of their financial transactions, against which charges have been made, without apparently any challenging or perusal of the papers which are entered as evidence.”

That is hardly living up to the rules of the game. But it is less astonishing, for all that, than his complete indifference to the opportunity freely offered him to cross-examine the witnesses himself. To this work, he lets it be known, he “will be unable to devote his time.”

Just what does Senator King expect the committee



to do? What is it he wants, further than the receipt of sworn testimony and a chance to question the testators? It is all so different from what both trade and public had been led to expect that it fairly takes one's breath away. There was much talk of "proofs" in the past. The Utah legislator submits his unsupported word as to the existence of a dye monopoly, but not one tangible proof. The dye industry submits sworn financial statements bearing directly upon the King charges. No need for the committee to "dig" for information. It is brought to them—showered upon them. And before the committee the twain are equal. What more can the committee do to establish or disprove the truth of that information? Actual arrest of the industry's representatives would reveal nothing more than would a cross-examination by those making the charges. Yet, provided with an opportunity to do this, Senator King weakly backs down and actually appears to avoid confronting those whom he had accused.

From all of which one may be quite justified in concluding that the real driving power is indeed gone from the King investigation. Indications are strongly in support of the intimation made in these columns that the King forces, seeing the turn affairs had taken after the Frelinghuysen amendment was adopted, and being unable to stop the investigation without a serious loss of prestige, were resigned, in the popular argot of the day, to "let it ride"—and eventually to play itself out.

The situation is well summed up by Senator Shortridge, chairman of the committee, who says: "Senator King was allowed more time to make his statement than any other witness, and was not required to take oath. The testimony of the other witnesses is given under oath which goes into the record. This record, which also contains all statements and printed evidence, will be thoroughly examined by the committee."

We believe that what Senator King now wants most of all is to see the investigation safely over, and that without being placed in a position where he may have to submit to questioning as to the basis of his charges himself. He promised "many new revelations," but so far has done no more than to repeat all his old repertoire of stock assertions. The trade has been eager to hear these revelations, eager to testify and eager to aid the investigators in every possible way.

We have no desire to be unduly abstruse, but believe it desirable to point out that when the instigator of an investigation like the present one begins to refer to it as a "so-called probe," his peculiar choice of words cannot but have its own significance in the minds of those who have been following the dye controversy carefully throughout the many months of its existence. For who was to have made this probe so potent, if not Senator King himself?

It would not, on the whole, be surprising to discover that Senator King wants very much to "pass the buck" to the committee, and to get gracefully away from the affair as soon as he can conveniently do so.

## Correspondence

### DR. HERTY'S JERSEY CITY ADDRESS—AN ADDITIONAL WORD FROM MR. ZINSSER

[Letterhead of the Synthetic Organic Chemical Manufacturers' Association of the United States]

February 26, 1922.

To the Editor of The REPORTER:

In connection with the communications from Dr. Ernster and others, I would appreciate your publishing the attached communication.

CHAS. H. HERTY, President.

[Letterhead of Zinsser & Co., Hastings-on-Hudson, N. Y.]

February 21, 1922.

To Dr. Charles H. Herty:

You have no doubt seen the various letters in the AMERICAN DYESTUFF REPORTER of February 13 written by Mr. Nobbe, Dr. Ernster, and the fourth person, who is Dr. Walch; and also a letter from the Chemische Fabrik Greisheim Elektron. I do not know whether you think it is worth while to answer these letters.

It seems to me that the matter has come down to a question of veracity between Dr. Ernster and the men in my office, and I want to say to you in very plain language that this man is simply trying to get out from under.

Whether he told the truth in our office, or whether he is telling the truth now, is a matter which I cannot decide; but I do know that he did not tell the truth both times.

We naturally cannot know whether Mr. Seeborn made the remarks attributed to him, nor do we know whether Dr. Ernster interviewed Von Weinberg or his representative, but we do know what he told us, and I should like very much to be confronted with this gentleman and get him to explain how it is he recognized himself in the statement you made, although his name was never mentioned and he was not told by any one of us that we had communicated with you.

Furthermore, I should like him to explain his letter to our Mr. Lehmann in which he said: "He might have given a lot of additional information."

Dr. Ernster says that so far as he is concerned, the matter is closed. I have no doubt that is what he would like best.

I am not willing to have both my son and Mr. Lehmann left in the embarrassing position they are in now. Dr. Ernster came up here unsolicited. He did not have any conversation with Mr. Lehmann before or after he was in the room with my son, and his statements were made voluntarily, and not as the result of any questions that were put to him.

Like very many of his countrymen, he may have said

these things to make himself important, and there may not be anything in all his various statements; but the fact that these statements were made, remains.

I am perfectly willing to have you publish this letter, and stand ready to further substantiate each statement made by us in this matter.

I am at your disposal at any and all times.

F. G. ZINSSER.

## THE EFFECT OF SCOURING AND BLEACHING UPON THE STRUCTURE AND STRENGTH OF COTTON FABRICS

(Continued from page 192.)

weight of the fabrics per square meter shows that the mean ratio of the breaking strain of the gray fabrics to that of the scoured fabrics is less than the ratio of the weight per square meter of gray to that of the scoured fabrics.

As a rule, the losses in tensile strain in the warp vary more than those in the weft. This is, no doubt, due to the removal of the size, added before weaving, which varies both in quantity and in composition.

While in the great majority of cases scouring is responsible for a reduction in the tensile strain, it should be mentioned that in a few samples a gain has actually been recorded. Examination of these fabrics has shown that in some cases excessive shrinking in the width of the fabrics had taken place, with the result that the 2-inch strip of the scoured fabric contained a greater number of warp threads than that of the gray fabric.

In other cases, excessive shrinking had taken place in the length of the fabric, which resulted in an increase in the number of weft threads.

It is important to remember that the actual loss in tensile strain, due to scouring, is greater warp way and less weft way than that shown in the tables, for the reason that under normal conditions, contraction in width and extension in length takes place during scouring.

The effect of scouring upon the counts of warp and weft—or, in other words, upon the weight of the yarns—is given in the following table, in which (a) gives the highest percentage of variation in one piece, (b) the lowest percentage of variation in one piece, and (c) the mean percentages of all the losses or all the gains:

	WARP.			WEFT.		
	(a)	(b)	(c)	(a)	(b)	(c)
I. Single ...	-37.7	-8.00	-20.0	-14.9	-0.0	-5.4
I. Folded ...	-4.6	-2.85	-3.72	-5.4	-5.4	-5.4
II. Single ...	-29.3	-6.60	-21.50	-23.0	-0.9	-5.5
III. Single ...	-33.0	-11.10	-20.86	-36.4	-0.0	-4.5
III. Folded ...	-17.0	-2.10	-7.95	-5.9	-0.0	-4.0
IV. Single ...	-39.3	-7.70	-23.40	-15.3	-9.0	-4.8
IV. Folded ...	-8.8	-7.70	-8.00	-1.7	-1.7	-1.7

While in no case has it been found that warp yarns become heavier in scouring, some such cases have been recorded in weft yarns.

The gains have been as follows:

	(a)	(b)	(c)
I. Single ...	+1.9	+1.4	+1.65
I. Folded ...	+1.5	+1.5	+1.50
II. Single ...	+7.1	+0.8	+4.20
III. Single ...	+9.4	+0.6	+4.40
III. Folded ...	+8.0	+8.0	+8.00
IV. Single ...	+10.9	+0.4	+5.10
IV. Folded ...	+5.0	+2.6	+3.80

The gains are, without doubt, due to excessive shrinkage of these fabrics in the width.

Taking the gains and the losses together, the mean percentage losses in the weight of all the yarns tested are as follows:

	Warp.	Weft.
I. Single ...	-20.00	-4.25
I. Folded ...	-3.72	-1.95
II. Single ...	-21.50	-3.40
III. Single ...	-20.86	-2.34
III. Folded ...	-7.90	-0.98
IV. Single ...	-20.40	-2.08
IV. Folded ...	-8.00	-1.96

The mean loss in weight of the warp and weft yarns in all the fabrics is, therefore, as follows:

	Warp.	Weft.
Single ...	-20.69%	-3.015%
Folded ...	-6.54%	-2.630%

It has thus been established that in all the fabrics tested, scouring removes about 3 per cent of impurities from single yarns, and that any loss above 3 per cent is due to the removal of the size contained in the warp.

Folded yarns show a smaller loss in scouring than single yarns. In the case of the weft, this may be attributed to the greater compactness of the fibers in the thread. The difference in the case of the warp is greater because folded yarns can be conveniently woven with a smaller percentage of size.

Fabric V is woven from finer yarns than those used in the manufacture of fabrics I to IV. From the complete particulars given in Table A it will be seen that, with the exception of the single thread tensile strain of the weft, which, as in other cases, is higher in the scoured than in the gray fabric, scouring has resulted in a decrease in strength similar to that of fabrics I to IV. The loss is greatest in the ripping strain warp way (17.5 per cent).

The loss in elongation in the tensile strain in the warp is increased to 61 per cent, and the gain in elongation in the weft way is increased to 55 per cent, and the loss in regain in the warp is increased to 57 per cent and the regain in the weft to 55 per cent.



TABLE A.

Grey.	Weight per Square Metre. Grms.	Tensile Strain:		Tensile Strain Elongation %.		Ripping.		Single Thread Tests.		Ends.	Picks.	Counts.		Regain.	
		Lbs. Warp.	Lbs. Weft.	Warp.	Weft.	Kilos. Warp.	Kilos. Weft.	Ozs. Warp.	Ozs. Weft.			Warp.	Weft.	Warp.	Weft.
Mean of I., II., III., and IV.	95.3	112.7	118.4	16.4	10.9	1.32	1.19	3.8	2.92	126.0	126.0	65.12	72.1	13.3	7.8
V. ...	53.6	63.5	59.4	12.6	8.4	1.12	0.97	3.72	2.60	123.1	139.0	101.4	131.6	8.1	6.8
Mean of VI., VII. & VIII.	125.0	94.8	95.8	21.9	17.6	1.94	1.47	6.9	3.5	67.4	67.6	21.7	24.7	—	—
IX. ...	167.0	45.0	32.8	10.0	13.0	1.33	1.10	3.2	1.7	57.2	54.8	32.0	46.0	—	—
X. ...	140.0	82.1	71.3	11.0	12.5	1.25	1.25	4.0	2.0	76.0	76.0	22.0	30.0	—	—

Fabrics VI, VII, VIII, IX and X have been woven from coarser yarns, and the number of ends and picks is considerably less than in fabrics I to V.

VI, VII and VIII (lime boil) have been treated as follows:

Boiled in lime.  
Soured.  
Boiled in soda ash.  
Chemicked.  
Boiled in soda ash.  
Chemicked.  
Soured.

IX (lime boil), short bleach, has been treated as follows:

Boiled in lime.  
Soured.  
Boiled in soda ash.  
Chemicked.  
Soured and washed.

X (caustic soda boil) has been treated as follows:

Boiled in caustic soda.  
Soured.  
Chemicked.  
Boiled in soda ash.  
Chemicked.  
Soured.

While the results of testing a fabric in the gray and in the scoured or bleached condition show the final effect of all the operations through which it had to pass, it seemed to be of interest to ascertain the effect on its properties produced by each of these operations.

The results of these tests are given in the graphs, and in order to allow of a more ready comparison of all the fabrics tested the results have been calculated in per cent. taking the gray fabrics as 100.

————— represents the warp.  
— — — — — represents the weft.

The following abbreviations have been used:

G. = gray  
St. = steep.  
L. = lime boil.  
C. = caustic soda boil.  
S. = soda ash boil.  
C.S. = caustic soda and soda ash boil.

Ch. = chemic.

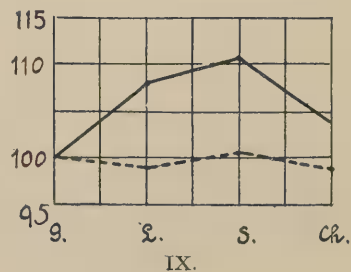
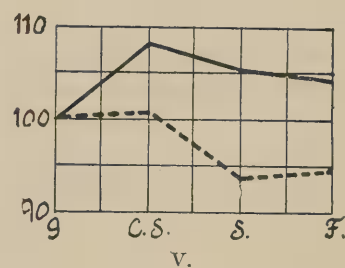
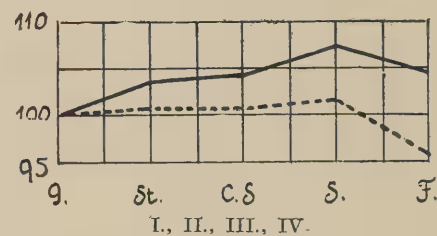
S.Ch. = soda ash boil, chemic and sour.

Sr. = sour and finished.

F. = finished.

As has already been pointed out, the number of warp threads per inch in a scoured fabric which has not been unduly stretched on the stenter increases, while that of the weft threads decreases. In I to IV the number of warp threads per inch increases steadily during the steep, the combined caustic and ash boil and the ash boil. The stentering ultimately somewhat reduces their number.

The number of weft threads per inch is little affected until the final operation, when a decrease, similar to that observed in the warp, takes place.



Fabric IX (short bleach) behaves very similar, but the decrease in the number of weft threads per inch is slightly less.

(To be concluded.)

# Milan Dyers Strike When Wages Are Cut to Meet Italian Industrial Crisis

Shortage of Electric Current Hampers Production—Consumers of Dyed Goods Continue Too Poor to Buy  
—Color Prices Rise in Company with Exchange Values—Mordants, Assistants, Etc.,  
Remain Stable Owing to Adequate Supply

By RAFFAELE SANSONE

Genoa, February 8, 1922.  
Special to The REPORTER.

THE last thirty-eight days provided many difficulties for Italian industries in general, and especially for the dyestuff industry. The scarcity of electric current continued, being little improved upon despite the importation of 150,000 kw.-hr. from Switzerland, the imposition of special limitations, the reduction of electric train service, and the working of old and new generating plants using coal, benzine, petroleum, heavy oils and weak fuels. The lower wages paid in rival countries and the consequent difficulty of competing with the prices of imported colored goods caused the employers in the dye works to refuse an increase in the wages of their workpeople, and to arrange a month's notice in cases of dismissal. This arrangement met with the disapproval of the dyers, especially in the Province of Milan, where they went out on strike, suspending all dyeing operations. In addition to the above, orders for colored goods were greatly limited owing to the reduced financial strength of the consumers, the majority of whom were obliged to prac-

tise the strictest economy in order to weather difficult financial conditions caused by the crisis in all industries.

## PRICES OF COAL-TAR DYES

A regain in the value of the Italian lira which brought the United States dollar from 24.50 lire to 21.50 lire, the English pound sterling from 97.50 lire to 91.50 lire, the French franc from 1.87 lire to 1.80 lire, and the German mark from 0.12 lira to 0.11 lira, increased, as can be seen from Table I, the dollar prices of colors per ton from the beginning of January to the date of writing.

## MORDANTS, ASSISTANTS, DYEHOUSE PRODUCTS

Despite the further regain in the value of the Italian lira, little change followed in the lira prices of mordants, assistants and dyehouse products owing to the small necessity of importing the same, the stocks available being often sufficient to meet all demands. Some of the lira and dollar quotations are given on the following page, per ton at Milan.

TABLE I

	Jan. 1 to Feb. 8 (lire)	January 1 (dollars)	February 8 (dollars)
Naphthol Yellow .....	50,000— 70,000	2,040—2,857	2,325—3,255
Auramine .....	70,000— 80,000	2,857—3,265	2,325—3,255
Orange II .....	30,000— 35,000	1,224—1,428	1,395—1,628
Nigrosine, water soluble.....	30,000— 40,000	1,224—1,632	1,395—1,860
Nigrosine, soluble in alcohol.....	35,000— 40,000	1,428—1,632	1,628—1,860
Sulphur Black .....	7,000— 10,000	285— 408	325— 465
Acid Black .....	35,000— 40,000	1,428—1,632	1,628—1,860
Direct Black .....	35,000— 40,000	1,428—1,632	1,628—1,860
Chrome Black .....	40,000— 45,000	1,632—1,836	1,860—2,093
Methylene Blue .....	80,000—100,000	3,265—4,080	3,720—4,651
Direct Blue .....	25,000— 30,000	1,020—1,224	1,162—1,395
Sulphur Blue .....	45,000— 50,000	1,836—2,040	2,093—2,325
Malachite Green .....	80,000—100,000	3,265—4,080	3,720—4,651
Acid Green .....	60,000— 70,000	2,448—2,857	2,790—3,255
Direct Green .....	50,000— 70,000	2,040—2,857	2,325—3,255
Bismarck Brown .....	40,000— 50,000	1,632—2,040	1,860—2,325
Magenta (Fuchsine) Crystals.....	70,000— 80,000	2,857—3,265	3,255—3,720
Eosine .....	60,000— 80,000	2,448—3,265	2,790—3,720
Ponceaux .....	35,000— 45,000	1,428—1,836	1,628—2,093
Methyl Violet .....	70,000— 80,000	2,857—3,265	3,255—3,720



TABLE II

	February 8			February 8	
	(lire)	(dollars)		(lire)	(dollars)
Acetate of alumina.....	1,600	74	Bisulphite of soda, 32 deg. Be.	400	18
Chrome alum .....	3,000	139	Chlorate of potash.....	3,500	162
Bichromate of potash.....	6,000	279	Chloride of ammonia.....	5,000	232
Ferrous sulphate .....	500	23	Bleaching powder .....	900	41
Copper sulphate .....	2,450	114	Nitrite of soda.....	3,000	139
Tartar emetic .....	12,000	558	Yellow prussiate of potash...	13,000	604
Aniline oil .....	10,000	465	Yellow prussiate of soda.....	9,000	418
White refined glycerine.....	9,600	446	Caustic soda, 70/72.....	2,700	125
Glucose, 45 deg. Be.....	3,900	181	Silicate of soda, 140 deg. Tw.	1,000	46
Hydrogen peroxide .....	2,100	98	Sodium sulphide .....	3,250	151
Tannic acid, 60 per cent.....	20,000	930	Logwood extract .....	10,000	465
Tartaric acid, crystals....	10,750	500	Yellow dextrine .....	3,900	181
Acetic acid, 30 per cent.....	2,500	116	White dextrine .....	4,000	186
Hydrochloric acid, 20-21° Be.	300	13	Farina .....	3,400	158
Formic acid .....	11,000	511	Kordofan gum .....	4,900	227
Lactic acid, 80 per cent.....	4,000	186	Indigo, 25 per cent.....	23,400	1,089
Alum .....	1,000	46	Beta-naphthol .....	18,000	837
Ammonia, 22 deg. Be.....	1,550	72	Industrial castor oil.....	5,000	232

### NEW NATIONAL BULLETINS DESCRIBE NATIONAL WOOL GREEN S, QUINOLINE YELLOW AND SULPHUR BLACK R

Three new bulletins of the National Aniline & Chemical Company, now ready for insertion in the company's loose-leaf binder, describe respectively National Wool Green S, National Quinoline Yellow, and National Sulphur Black R.

National Wool Green S will be of interest to dyers of woolen and worsted yarns and constitutes a valuable addition to the company's line of acid dyes because of its excellent level-dyeing properties and all-around good fastness. It may successfully be employed in the production of mode shades on worsted or woolen dress goods, and is one of the few dyes which may safely be added to the boiling dye bath for shading purposes. It will also be found suitable for dyeing weighted or unweighted silk, as well as of service to the dyer of carpet yarn. After-treatment with bichromate somewhat improves its fastness to light and washing without materially altering the shade.

National Quinoline Yellow yields the clearest and greenest shade of the acid yellows and may be used on wool or silk, wherever a level-dyeing yellow of extremely bright and greenish shade is required. It will be found entirely suitable for dyeing combination shades. It possesses moderate fastness to light and washing, and is equal in all respects to the European products marketed as Quinoline or Chinoline Yellow. Further use for this product is found in the leather, paper and lake industries.

National Sulphur Black R is a new type of Sulphur Black producing a distinctly red shade which should be most desirable. The complete solubility of this product in comparatively small amounts of sodium sulphide makes it valuable for the dyeing of raw stock in vacuum dyeing

machines, as well as for yarns in beam and cop dyeing machines. Its easy-leveling qualities make it, likewise, suitable for the dyeing of warps and piece goods.

### DR. J. A. AMBLER COMPLETES COMPILATION OF AMERICAN DYE PATENTS

Dr. Joseph A. Ambler, acting chemist in charge of the Color Investigation Laboratory, Bureau of Chemistry, Department of Agriculture, has finally completed a compilation of the American patents on dyes.

Dr. Ambler is a graduate of Sheffield Scientific School, Yale, and taught chemistry successfully in a Nova Scotia College before doing important research work in a big Poughkeepsie, N. Y., plant before the war. He has written valuable treatises on dye methods and qualitative detection, having been awarded patents for several discoveries along these lines.

The Government plant at Arlington is now utilized for research and experimental work, the present research having to do with questions of supplies of intermediates. These experiments are carried on in the building on the grounds of the Arlington Experimental Farm, Arlington, Va.

The laboratory is investigating the methods of manufacture and preparation of dyestuffs and, more especially, their intermediates, also the study of raw materials found or produced in the United States. Particular stress is laid on the fundamental study of the physical and chemical properties of these substances, and of the important reactions used in their manufacture.

This is a field which industrial concerns often have not the time or means of entering. As a result of these studies, new methods of testing some of the reaction mixtures obtained in manufacturing operations, such as sulfonations and chlorinations, have been devised. New and im-

proved methods of manufacture have also been worked out for a number of important intermediates, such as the production of phthalic anhydride by the catalytic vapor phase, oxidation of naphthalene with air, also the vapor phase sulfonation of organic compounds.

A new series has been successfully worked out, called the kryptocyanines, which has a characteristic absorption maximum and sensitizing maximum in the infra red.

Just now the laboratory is working especially on the production of furfural from corn cobs, and studying all possible uses of this former chemical curiosity, with very promising results. The substance has been shown to have a possible use as a solvent for resins, as a raw material for synthetic resins, both of the type of bakelite or condensite, fusible types, which have possible uses as varnishes and enamels.

But an especially practical work done by this laboratory is the compilation of national dye patents, which have been abstracted under seven different headings, in order to make the compilation accessible from as many points of inquiry as possible. The abstracts have been typed on cards 3 by 5 inches. Hence any desired patent may be found under any one of the following headings:

1. Scientific name; when known or given in the patent.
2. Intermediates used, with a very condensed statement of the method of manufacture.
3. Class of dye, according to Schultz's eighteen chemical classes.
4. Color of dye.
5. Method of use.
6. Fiber or material for which suitable.
7. Name of owner and, in parenthesis, name of patentee.

The abstracts and the compilation as a whole are not intended to do away with the consulting of the patents themselves, but merely to serve as a helpful cross-index to them. At the same time, the cards contain sufficient information to enable the user to decide which of several possible patents is the one he may be looking for, without the necessity of handling the patents themselves.

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#### CAMPBELL ISSUES FOLDERS FOR AMIDINE FAST GRAY BN, BORDEAUX, AND VIOLET B, R AND N

Amidine Fast Gray BN, Amidine Bordeaux, and Amidine Violet B, R and N, are three of the colors marketed by John Campbell & Co. described in folders just issued to the trade for inclusion in loose-leaf binder files. These folders, in addition to containing dyed patterns and descriptions, also include methods of application of the colors described.

Amidine Fast Gray BN is a new direct cotton dyestuff possessing excellent leveling properties and good fastness to light, alkali, acetic acid and hot pressing. It is a recognized standard for cotton piece dyeing by the pad method, and on account of its good solubility is suitable

for machine dyeing. It is also favored for the dyeing of mixed fibers composed of cotton and silk, and cotton and artificial silk hose, since it dyes all fibers uniformly.

Amidine Bordeaux should be of interest to dyers of carbonized shoddy and other mixed fibers such as cotton and silk hosiery, because of its excellent covering power. Solid shades are obtained at low dyeing cost. It is likewise a standard product for cotton raw stock, particularly Canton flannels and other napped goods, as well as for yarn dyeing. The company warns users, however, that this color is *not* fast to acid, and care should be taken in handling it, as with Congo Red and other sensitive colors.

The company's three straight direct dyeing Violets are useful for practically all forms of cotton dyeing, mixed fibers and artificial silk. Amidine Violet B is the bluest type, and serves pad dyers and discharge printers to good advantage. The shade turns redder when "hot pressed," but returns when cooled. It possesses normal fastness to light, good fastness to acetic acid, and discharges a clear white with hydrosulphite. It is also recommended for "hurl dyeing" of woolen goods. Amidine Violet R is a good product for mixed fiber dyeing. It possesses good fastness to light and to acetic acid. The shade is fast to hot pressing. It is serviceable for lilacs and heliotropes on cotton raw stock, roving, and yarns for underwear. On account of its good solubility and leveling qualities it is recommended for machine dyeing. Amidine Violet N is valuable for the gingham and corduroy trades, being generally recognized as a color possessing good fastness to light. Cotton and wool are dyed practically the same shade. Its fastness to acid, alkali, washing and hot pressing is good, and it discharges well with hydrosulphite.

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The firm name of Henshall Bros. Silk Finishing Company, dyers and finishers, Paterson, N. J., has been changed to Henshall Bros., Inc.

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The Westminster Textile Company, Boston, Mass., and Cumberland, R. I., has been incorporated, with capital of \$40,000, by Charles Chell, Lowell, Mass.; Samuel Siskind, Boston, and Leon W. Mowry, Slatersville, R. I.

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The interest of Carson & Toy, proprietors of the Fairmount Dye Works, Philadelphia, Pa., dyers and bleachers, has been purchased by Arthur J. Boyer and Murray Gibson, Jr., who are operating the plant under the name Fairmount Dye Works.

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J. & P. Coats, Inc., Pawtucket, R. I., have awarded the contract for building a new bleachery. The latter will be one story, of brick, 105 x 316 feet. The J. W. Bishop Company, Worcester, Mass., has the construction contract.

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The International Chemical Products Company, San Fernando, Cal., has been incorporated with a capital of \$250,000. The incorporators are Arthur G. and Bernard A. Munn and H. J. Poppelman, all of San Fernando.



## Textile Alliance Publishes Dyestuff Transactions to Refute Kuttroff-Pickhardt Charges

OWING to the public nature of its dyestuff operations, the Textile Alliance, Inc., feels that it should make public a resume of its operations since it took charge of the importation and distribution of Reparation Dyes, at the request of the State Department.

The following tabulation of licenses, or permits, issued by the Dye and Chemical Section, Division of Customs, Treasury Department, shows that during the year 1921 there were issued to the Textile Alliance, Inc., less than 16 per cent of the permits issued during 1921 for the importation of dyestuffs.

This statement confirms what is widely understood among dyestuff consumers—namely, that the Textile Alliance, Inc., imports and distributes only a very small percentage of the total amount of foreign-made dyes sold in this country, which amount is shown from official records to be less than one-sixth of the total.

The statement made before the subcommittee of the Committee on Judiciary of the United States Senate by the Counsel for Messrs. Kuttroff, Pickhardt & Co., Inc.,

to the effect that no German-made dyes were imported into America except through the Textile Alliance, Inc. (page 614, Testimony; February 28, 1922) is thus shown to be untrue.

The great importance of this 16 per cent lies not in its volume, but in the fact that not being under the control of the German Cartel it is invaluable in controlling prices of dyes not made in the United States and preventing the re-establishment of the German monopoly.

The scope and magnitude of these operations are clearly set forth in group order in the table below.

Messrs. Barrow, Wade, Guthrie & Co., C. P. A., have furnished a certificate which is on file with the subcommittee of the Committee on Judiciary showing that the statements given wide circulation (Exhibit—Testimony, March 3, 1922) to the effect that the Textile Alliance, Inc., is engaged in a general dyestuff business, purchasing dyes from many sources and selling them in many countries, are entirely untrue. The only purchase from any source except the Reparation Commission, and an option

Table

*Dye Operations of Textile Alliance, Inc., from 1919 to February 16, 1922*

	Pounds	Period of Transactions	Pounds Sold	Sold for
Reparation dyes—				
300 tons .....	348,332	(December, 1919 .....	348,322)	
		(to .....	)	\$3,836,373.70
Herty option .....	835,611	(October, 1921 .....	835,611)	
Reparation (underwritten) dyes—				
1,200 tons .....	223,812	April 15, 1921, to date.....	178,061)	
1,500 tons .....	264,743	July 15, 1921, to date.....	229,967)	
Daily production .....	379,888	Dec. 1, 1921, to date.....	371,882)	2,640,497.84
Exchange .....	527,576	July 1, 1921, to date.....	224,430)	
First manufacturing program .....	165,671	Oct. 1, 1921, to date.....	41,396)	
Indigo (sold to China) .....	961,115	July 16, 1920–Dec. 30, 1920	961,114	705,973.27
Total received .....	3,706,737	Total sold .....	3,190,783	\$7,182,844.81
Unfilled orders for reparation .....	197,799	Total on hand .....	515,954	
		Total on order .....	197,799	
Grand total .....	3,904,536		3,904,536	
Deduct Indigo .....	961,114			
Balance dyes .....	2,943,422			
Deduct unfilled orders .....	197,799			
Balance dyes received .....	2,745,623	Insured (selling) value, goods on hand		1,252,696.74
Deduct Herty option .....	835,611			
Total reparation dyes other than Indigo.....	1,910,012	Total selling value of goods sold and on hand .....		\$8,445,541.55

secured direct from the German manufacturers by a representative of the Department of State, was two small lots bought from the French Government through the Union Des Matieres Colorantes. The only lot sold elsewhere than in the United States was one lot of 961,114 pounds of Indigo sold to China.

The Textile Alliance, Inc., has substantial stocks of dyes either in New York or on order, which should reassure consumers as to their future needs of necessary types not made in this country.

#### *Licenses Issued 1921*

	Pounds	Total Pounds
Licenses issued to T. A. I. for import from Germany.....	327,598	
	401,783	
All other licenses issued for import from Germany .....	1,671,134	
Total from Germany .....		2,400,515
Licenses issued to T. A. I. for import from France .....	30,043	
All other licenses from France....	9,352	
Total from France .....		39,395
Licenses issued for import from England, Switzerland and others		2,268,605
Grand total .....		4,708,515
Per cent to Textile Alliance, Inc., 15.5 per cent.		

### **NEW DOUBLING MACHINE FOR SILKS, DOUBLES AND TWISTS IN ONE OPERATION**

The Scranton Silk Machine Company is showing a new "Duplex" machine which embodies entirely new and patented principles for doubling and twisting silks in one operation.

Two or more threads are drawn from the bobbins on the jack pins through a positive and quick-acting stop motion by two "take-up" rolls, which are driven by a bevel gear, and are engaged or disengaged by the action of the stop motion. These take-up rolls are driven through a direct gear ratio from the spindle belt. This assures a positive delivery of silk to the spindle at all times.

The change of twist is accomplished by inserting a new or intermediate gear (according to twist chart) on shafts which are readily accessible on the end stand. This controls the speed of the "take-up" rolls and thence the delivery of silk to the spindle. The spindles are mounted on a swing bracket and driven by a whorl of one inch diameter, assuring a uniform spindle speed.

The traverse rails are driven by a cam on the head end of the machine, and is most accurately built mechanically for a uniform motion. The brackets carrying the builder rings are mounted individually for each spindle and allow

adjustment for any unevenness in the building height of the bobbin.

The "stop mechanism" is an absolute control for each spindle unit, from the threads on the jack pins through the take-up rolls to the bobbin on the spindle. The spindle comes away from the belt and rests against a brake, stopping the revolving bobbin and preventing hard twist. The spindles are spaced  $4\frac{1}{2}$  inches on the machine for six and eight thread doubling and  $5\frac{1}{4}$  inches on ten and twelve thread doubling, which minimizes the possibility of the ends becoming entangled and thus causing a kick-off.

The machines are arranged for drive by individual two horse-power or by belt from the line shaft. Ball bearings are used on driving parts to reduce power requirements to a minimum.

The standard machine is built as follows: 100 spindles on frame for six and eight thread doubling, 22 feet 10 inches long, 1 foot six inches wide; 86 spindles on frame for ten and twelve thread doubling, 22 feet 10 inches long, 1 foot 6 inches wide. The length covers the total outside dimensions, including drive pulleys or motor. The shipping weight is 2,700 pounds.

Three sets of twist gears are furnished as part of the regular equipment; extra gears upon request. The traverse stroke, size and type of ring are furnished to meet the specific requirement.

### **NOTES OF THE TRADE**

The Silk Yarn Trading Company, 121-131 West Nineteenth Street, New York, doing a thrown silk business exclusively, has recently enlarged its raw silk throwing facilities. The company has leased for a term of years the premises at York Avenue and East Eighteenth Street, Paterson, N. J., where, with the latest improved machinery, it will materially increase its production of thrown silks.

According to a British patent, a process has been invented for the manufacture of viscose silk into fine threads below six deniers by using spinning apertures of about 0.10 mm. diameter, feeding the viscose to the nozzles in exact quantities according to the desired denier, and using dilute sulphuric acid as the spinning bath. The finer the thread desired the higher the concentration of acid in this bath.

The final official general memorandum on the indigo crop of 1921-22, based upon reports received from provinces containing practically the whole area under indigo in British India, refers to the crop which is now being marketed. The total area is estimated at 316,600 acres, which is 32 per cent above the finally revised area of last year. The total yield of dye is estimated at 60,900 cwt. (90,900 factory maunds), as against 41,200 cwt. (61,500 factory maunds), the finally revised estimate of last year.



on an increase of 48 per cent. The season was, on the whole, favorable and the condition of the crop is reported to be generally good.

A copper drying can, charged with steam, recently exploded at the plant of the Windsor Print Works Division of the Consolidated Textile Corporation, North Adams, Mass., causing injury to John T. Pratt, aged sixty-five, from which he subsequently died. Four other employees of the plant were more or less seriously hurt by the explosion, but the splendid service rendered by the corporation's welfare nurses did much to lessen the severity of the injuries sustained by these men, and, it is said, all will recover.

It has been semi-officially announced that no American Silk Mission will go to Japan this year. American silk manufacturers are not prepared just now to go further into the problems of raw silk classification, and the question of changing the standard size of raw silk to 14/16 denier and the reform or abolition of the Yokohama Exchange can be discussed here to better advantage, from the manufacturers' viewpoint, than in Japan. Also, with raw silk prices continuing their erratic and unexpected fluctuations, very few silk men have expressed a willingness to leave the scene of operations for the length of time necessary to visit Japan.

The Burstein Woolen Company, Chelsea, Mass., manufacturers of woolen rags, bags and burlap, has been incorporated with a capital of \$4,000; forty shares all issued for cash. Incorporators: President and treasurer, William H. Hodgkins, 102 Congress Avenue, Chelsea, twenty shares; clerk, August I. Weisberg, nineteen shares; director, Joseph Atkins, one share.

Silk fabrics are now being dyed and finished in the plant of the Continental Dyeing & Finishing Company, Inc., at 414 Eighteenth Street, West New York, N. J. The officers of the firm, all of whom are well known in the silk industry, are: President, Jean Thomas; vice-president, G. Mitchell; secretary-treasurer, Harry Ruvo. Mr. Ruvo is the general manager as well as trade representative, while his two associates manage the dyeing and finishing departments. The firm is conducting a general piece dyeing and finishing business, specializing in crepe de chine and georgettes.

Frank Kelly has been promoted from assistant to boss dyer at the Saranac Mills of the American Woolen Company, Blackstone, Mass., to succeed John J. Heffernan, who has resigned to become boss dyer for the Verdun Worsted Company, Woonsocket, R. I.

The Velvet Textile Corporation, Paterson, N. J., has been incorporated, with a capital of \$200,000, to manufacture and sell velvet, plush, pile and other fabrics. The incorporators are Clifford L. Newman, Julia V. Many and Ethel Carnathan.

The Middletown Textile Company has been incorporated, under the laws of Connecticut, with a capitalization of \$25,000, to manufacture textile goods, including gloves, by Frank B. and Mary H. Bement and Lowndes A. Smith.

The Dodge Chemical Company, Boston, Mass., has elected Albert N. Lockhart president and Clara F. Dodge, of 20 Waban Street, Boston, treasurer. The company was incorporated on February 1 with \$50,000 capital, the incorporators being the officers and Arlita D. Parker.

More than three hundred individual exhibits of all kinds of merchandise will feature the first annual international sample fair to be held in the Seventy-first Regiment Armory, New York, from April 3 to 8, inclusive. Agents, manufacturers, importers and exporters will be represented in the exhibit. The fair is intended by its officials to be strictly a trade and merchandising opportunity, and the general public will not be invited to see it.

Cap Rock Mills, Post, Tex., recently formed, are to build a cotton yarn mill with initial equipment of 30,000 spindles. J. F. Sirrene & Co., Greenville, S. C., are the architects and engineers, and bids on the new mill will be received until August 1 of this year.

Artcraft Silk Hosiery Mills, Philadelphia, Pa., have been formed and a plant at Erie Avenue and Amber Street will be equipped for the manufacture of women's full-fashioned silk hosiery. The product will be sold by the Daisy Whitehead Knitting Company, New York, under the trade name Artcraft Silver Stripe. The organizers of the company are H. A. and J. A. Sacks and Jacob Kugleman.

The Giles Dyeing Machinery Company, Germantown, Pa., specializing in large lot machines, is placing on the market an entirely new dyeing machine. Recently there was shipped from a leading carpet mill a one-piece, plain, seamless chenille rug weighing 3,000 pounds, the wool face yarn alone weighing 1,200 pounds, and this was dyed in one lot. So even was the coloring, it is claimed, that no detectable variation in shade was observable. It is probable that so heavy a rug was never made before and it is claimed that so large a quantity of yarn was never before dyed in one lot.

The D. O. Pease Manufacturing Company, Worcester, Mass., has been incorporated to do a general textile manufacturing business. Capital, \$50,000 preferred, 500 shares of a par value of \$100 each, and 1,500 common shares without par value. Of this capital, 240 shares preferred and 950 common shares are issued. Incorporators are: President and treasurer, Durell O. Pease, 656 Main Street, Worcester, holding 50 preferred and 349 common shares; clerk, Henry L. Parker, and director, E. Kent Swift, Northbridge, Mass., holding 90 preferred and 300 common shares.



## MEN OF MARK in the DYESTUFF FIELD

ROBERT E. ROSE, Ph.D.

Technical Laboratory  
Director, Dyestuffs Division

E. I. du Pont de Nemours & Co.  
Wilmington, Del.

**R**OBERT EVSTAFIEFF ROSE was born June 2, 1879, in Palermo, Sicily, of Norman-Scotch-English-Italian-Spanish-Russian-American descent. His travels began at the early age of four, when he homesteaded in the Canadian Northwest. Before returning to Europe he went on to California, where his schooling began.

With only two years of study at an English private school, together with what he could gain from outside sources, he matriculated at the age of sixteen in the University of Leipzig, the youngest student enrolled. In 1903 he obtained his Ph.D. in organic chemistry for research under Johannes Wislicenus, the great pioneer of modern carbon chemistry.

At the University of St. Andrews, where he went immediately after obtaining his degree, Dr. Rose not only did very highly specialized research on sugars, but also learned to play golf.

In 1905 he moved to University College, Nottingham, England, where he became familiar with the idiosyncrasies of optically active silicon compounds.

1907 found him Assistant Professor of Chemistry in the University of Washington, where he remained for some years.

In 1917 he became a Fellow at the Mellon Institute of Industrial Research, Pittsburgh, working on the special problems presented by the oil industry.

He entered the employ of the Du Pont Company in 1918 and devoted himself to dye research as assistant to the head of the Organic Research Division of the company, and since the beginning of 1921 has been in charge of the Technical Laboratory of the Dyestuffs Department of E. I. du Pont de Nemours & Co., at Wilmington, Del.



## Review of Recent Literature

*Textile Raw Materials and Their Conversion Into Yarns.* Julius Zipser (translated from the German by D. T. Nisbet); London, England. (Second edition.)

This is the second English edition of the original German work, the first English edition having been published in 1901. The translator has attempted to present the work in an improved form, certain unessential parts having been eliminated, additions made and the book rewritten in part.

The book was originally prepared for students in technical schools as well as for self-instruction on the part of those engaged in the industry. After discussing the important textile raw materials and methods of their detection and estimation in yarns and fabrics, the author takes up the technology of spinning, reviewing the various processes used for both vegetable and animal fibers.

The volume is illustrated with drawings of the various machines involved. It offers to the mill man a knowledge of the raw materials in respect to their derivation, origin, cultivation, collection, form, structure and characteristics, as well as their utilization and conversion into yarn.

*The Application of the Principles of Efficiency to the Teaching of Chemistry.* J. Norman Taylor, Dyestuffs and Explosives Laboratory, George Washington University. School Science and Mathematics, Dec., 1921; Vol. XXI, No. 9.

This paper, which has since been reprinted in pamphlet form, confines itself to an outline of the principles of efficiency as applied to chemistry teaching without attempting a detailed discussion. Author holds, with Dr. Mann, that complete and true efficiency is material only in its application, and is fundamentally ethical or moral in its nature; individuals or groups of individuals who do not realize and demonstrate the truth that it is servant and not master, are attempting to operate against natural laws. He adopts for the purposes of his article the definition of Harrington Emerson, who declares efficiency to be "mental and physical ability to find and take the best, easiest and quickest ways to the desirable things of life." Author then outlines the thirteen principles of efficiency according to Emerson's latest classification, and under each one mentions its application to the teaching of chemistry, likewise giving practical suggestions as to such application.

These principles, which are at once independent and interdependent, are divided into seven practical and six ethical ones, as follows: Practical: Records, Plans, Schedules, Despatching, Standardized Conditions, Standardized Operations, Written Standard Practice Instructions; Ethical: Ideals, Common Sense, Competent Counsel, Discipline, Fair Deal, Efficiency Reward.

How these principles of efficiency may be applied to the teaching of chemistry so as to secure a maximum of results in a minimum of time should make interesting reading for instructors in this and, perhaps, other sciences as well. There are few men following this important and trying occupation who have not attempted to work out efficiency systems of their own, and for the purpose of reinforcing their own judgment, if for no other, a perusal of the methods outlined in this article should be worth while. Many of the suggestions given are of undoubted value, and in any case, the pamphlet will prove helpful to a majority of our instructors in reorganizing already existing systems, or rounding out and completing them in several important particulars. In short, it may safely be said that the most efficient way of establishing an efficiency system is not by the "trial-and-error" method, but by the study of such a brochure, especially designed to fit the peculiar needs of a specific occupation.

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the **AMERICAN DYESTUFF REPORTER** by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

D. B. M.—*Question:* We are installing a Franklin Process Machine and expect to dye sulphur blacks with same. We require a very stiff yarn and wish to ask whether you would deem it advisable to omit a softener, such as turkey red oil, from the wash water in order to retain stiffness in the yarn.

*Answer:* It would be entirely practicable to omit a softener from the wash water in order to retain stiffness in the yarn; however, the yarn should be thoroughly washed.

The only precaution to be used to prevent tendering is to chrome the black after dyeing it.

L. L. S.—*Question:* Will you please advise me as to what soluble mordant might be incorporated with gelatine with a view to precipitation of such dyes as Patent Blue and Quinoline Yellow?

Also, can Acid Cyanine G, or its equivalent be obtained in the United States?

*Answer:* Barium chloride precipitated with sulphuric acid forms barium sulphate, which, incorporated with gelatine, will accomplish the result outlined in the first paragraph of your letter.

In regard to the second paragraph, Acid Cyanine G,

or its equivalent, is not obtainable in the United States, unless possibly from the Eastman Kodak Company, who might make it for their own use; but whether or not they make it in commercial quantities we cannot say.

**C. C. D.—Question:** If chroming prevents tendering of goods dyed with Sulphur Black, as stated in your department of *THE REPORTER* for February 13, why do not manufacturers of Sulphur Black recommend that process with their product?

**Answer:** Several of the large manufacturers of Sulphur Black inform us that they do, as a matter of fact, recommend after-chroming as a means of preventing tendering of goods dyed with this product. There seems to be no question but that after-chroming is generally accepted as a suitable means to this end.

**J. N. T.—Question:** I am dyeing worsted pieces with resisted silk effects but find that my whites are generally tinted yellow. I use after-chromed dyes. Does the dye or the chrome cause the tinting?

**Answer:** The general practice is to have the colors resisted but to make the whites with pure silk only. The reason for the staining is that the action of bichromates on the tannic acid, used for resisting, produces a yellow pigment. Care should be used to select a line of dyes that do not stain silk and then see that there is a perfect exhaust of the dye bath. In the case of Carmoisine a complete exhaust cannot be obtained if any Glauber's salt is used and 15 to 20 per cent of acetic acid is necessary. Many other chrome colors give clearer silk if the Glauber's salt is omitted. After dyeing, even under the most favorable conditions, the silk is often slightly tinted and it is customary to clean with 2 per cent of hydro-sulphite at 120 deg. Fahr.

## Recent Patents

### Dyeing Apparatus

(1,405,299; January 31, 1922)

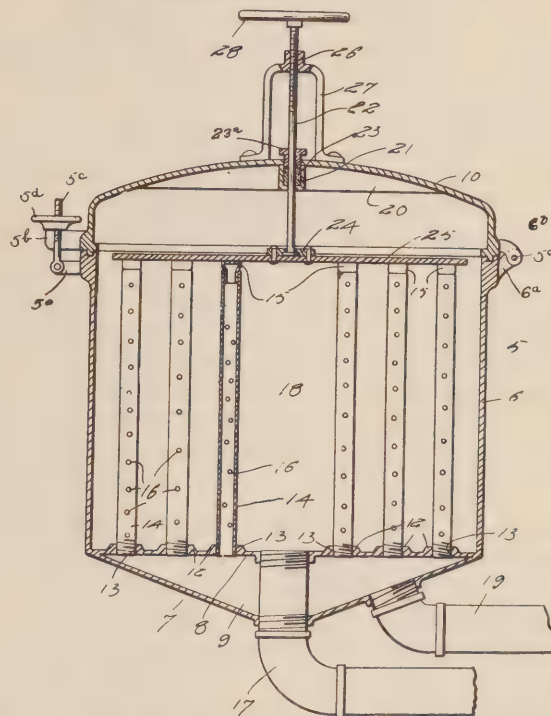
WADE H. DAVIS, Rosemary, N. C.

The object is to enable the bundles of yarn or like material to be evenly compressed throughout the mass within the treating apparatus whereby an even flow of liquid may be distributed throughout the mass of fibrous material, and to accomplish this result with economy of labor and of time.

It comprises an improved apparatus of the type in which bundles of yarn or similar fibrous material are sustained on holders adapted to permit a flow of liquid laterally therefrom or thereto throughout their lengths and enable said liquid to be evenly distributed throughout the fibers in the bundles held on them. The apparatus is so constructed that flow of the liquid treating material may pass laterally through the holders and out through the yarn or reversely through the yarn and out through the holders. The kier or treating container comprised in

this apparatus is entirely open at the top, exposing the entire cross section of the container; and it is provided with a cover adapted to be fitted fluid tight, or to be opened to expose completely the top of the kier, and is preferably hinged to outward projecting brackets so that the cover may be turned 90 deg. or more on the hinge, affording full vertical clearance above the kier, and permitting it to approach its seat in closing at a relatively small angle so as to avoid applying material side pressure to the yarn or the like that may extend above the holders.

The illustration is a vertical section through one form of the improved apparatus.



A tank or kier is indicated, generally, in the drawing by the numeral 5. This kier has a cylindrical wall 6 and a generally conical bottom 7. Crossing the interior of the tank or kier 5 above the conical bottom at the junction thereof with the cylindrical wall 6 is a septum or partition 8 provided on its upper surface with a number of bosses 12 through which central threaded perforations 13 extend. Threaded into the perforations 13 are an equal number of yarn holders 14 consisting of tubes projecting upward in parallel relation to a level approximating the top of the tank wall 6. The upper ends of these tubes are closed by the plugs 15, which may be screw threaded or permanently secured to the upper ends of the tubes. The walls of the tubes are perforated as shown at 16 with numerous orifices adapting liquid to flow laterally from the tubes in substantially all directions throughout their lengths. The lower ends of said holders or tubes 14 open into the compartment 9 formed between the conical bottom 7 and the partition 8.

A pipe 17 passes through the apex of the tubular bottom, extends through the chamber 9 and opens into the chamber 18 above said perforated partition. A pipe 19 is tapped into the conical bottom 7, said pipe opening into chamber 9 between the bottom 7 and the partition 8.



A hinge bracket 6a extends outward from adjacent the upper margin of the cylindrical wall 6, and a similar hinge bracket 6b projects from a cover 10, the hinge pintle 5a being passed through said brackets whereby the said cover 10 is hingedly connected to the kier 5. Projecting radially at one or several points around the edge of the cover 10 are pairs of spaced ears 5b. Hinged to lugs 5e projecting from the wall 6 of the kier 5 at points beneath the projecting ears 5b are bolts 5c adapted to project between the ears 5b. Threaded on each bolt 5c is a hand nut 5d. By means of the bolt 5c and nut 5d the cover 10 may be screwed tightly down upon the top of the walls 6 of the kier 5 in order to produce a fluid tight joint. The joint shown is preferably a tongued and grooved joint and may be provided with a suitable gasket if necessary, the upper portion of the wall being shown as thickened to provide therefor. The under side of the cover 10 may be supplied with suitable strengthening ribs 20. Centrally of said cover a gland 21 is provided containing packing material 23, and a follower 23a for confining it. Through said gland extends the rod 22 having a swivel connection, as shown at 24, with a presser plate 25 of sufficient area to extend over the top of all of the holders 14. The upper portion of the rod 22 is threaded, as shown at 6, into a bracket 27, and carries on its extremity a hand wheel 28 by means of which said threaded rod 22 may be rotated in the threaded portion of the bracket 27 and elevate or depress the plate 25.

In use, the cover 10 will be opened fully, and in the construction shown it is preferred to use a hoist for lifting said cover. In the usual practice balls or parcels of yarn, wound on cores consisting of coil springs covered with pervious fabric, will be threaded over the holders 14. The lower parcels of this yarn, resting on the bosses 12, will be elevated above any sediment that may collect on the plate 8. The upper parcels of yarn will extend above the tops of the holders 14. After the holders have been loaded with an equal number of parcels on each, or such a number of parcels as will bring the tops of the yarn threaded on the holders 14 to substantially the same level above the tops of said holders 14, the cover 10 will be lowered to position, the plate 25 having meanwhile been withdrawn or raised toward the upper side of the cover by manipulating the hand wheel 28. The hinged bolts 5c will then be turned upward so as to pass between the pairs of ears 5b and the nut 5d will be turned down so as to clamp the cover fluid tight to its seat. Thereafter by turning the hand wheel 28 the presser plate 25 will be forced downward applying even pressure to the masses of yarn held on the holders 14. It is not necessary to apply a heavy pressure on the yarn, the purpose being to get an even pressure throughout the mass so that the bleaching or dyeing liquid will be applied evenly to the entire mass. After the yarn has been compressed as described the bleaching or dyeing liquid may be forced through one or the other of the pipes 17 or 19. Should it be forced first through the pipe 19 the liquid will pass into the chamber 9 and thence up through the holders 14 and be disseminated throughout the bundles of yarn held

thereon and will return through the pipe 117 to the source of supply. The flow of liquid may be reversed, as by a four way valve, in the well-known manner, and cause to flow in through the pipe 17 to the chamber 13 and through the bundles of yarn from the outside returning through the holders 14 into the chamber 9 and back through the pipe 19. Reversal of the dyeing or bleaching liquid in this manner is known and no further description thereof need be given.

The form of apparatus illustrated is particularly adapted for large kiers designed to treat a large mass of yarn at one treatment and wherein it will be difficult to close the cover by hand and apply by the closing of the cover the necessary pressure to the yarn. The presence of the adjustable presser plate 25 manipulated by the screw 22 enables the cover to be closed and screwed down by hand and the necessary pressure afterwards applied.

### Apparatus for Treating Wool, Slubbing, Yarns, and Other Fibrous Material

(1,405,038; January 31, 1922)

JOE KERSHAW, Menston, England

This invention relates to machines or apparatus for dyeing, mordanting, bleaching, scouring or similarly treating with liquors or liquids wool, slubbing, yarn, wool and cotton wastes, woolen and cotton warps, hose, rags, jute and all raw materials in which the material during treatment is placed in a tank or vat between a vertically reciprocating perforated or the like false bottom and a stationary lattice or the like top and is repeatedly squeezed or compressed when saturated with the liquor or liquid and allowed to open out or expand after each compression, and it relates particularly to the machine or apparatus described and illustrated in the specification of British Letters Patent No. 122,227, in which the lift of the false bottom can be varied to suit the bulk or weight of material under treatment, and the object of the present invention is to facilitate and expedite the handling of the material under treatment.

In accordance with this invention the tank or vat is provided with a perforated or the like inner cage to receive the material under treatment. The cage which is open at the top is divided horizontally into two or more sections fitting each other telescopically and when in its working state rests on the false bottom with the top section connected by suitable means to the stationary lattice or the like top. The bottom of the cage is provided with a door or doors to allow for the removal of the treated material contained therein.

When the material under treatment is in hank form it is preferably carried on the usual sticks supported in end plates which are slideably mounted in suitable guides secured to the lattice or the like top so that the end plates and the sticks with the material can readily be removed. Also when the material is in hank form it is found advantageous to impart to the false bottom a quick up-stroke or lift and a slow down-stroke or fall with or without a dwell at the bottom of its stroke and this is accom-

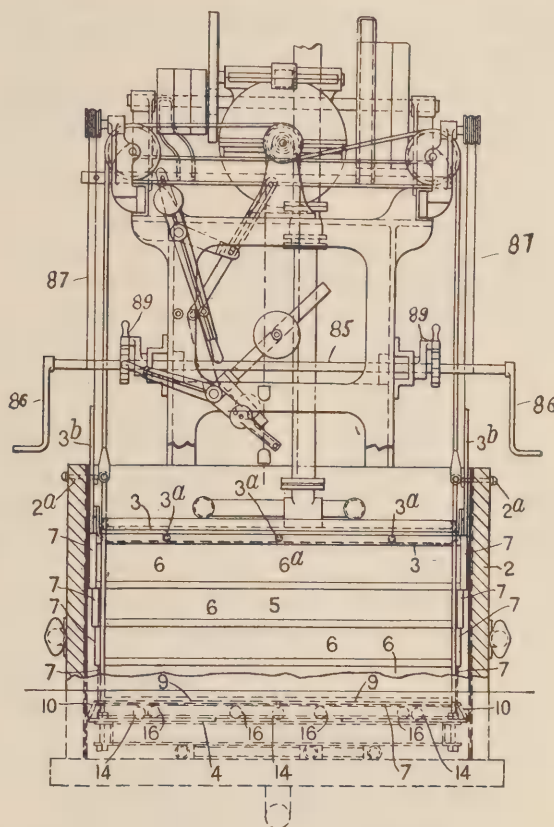
plished by altering the diameters of the two sets of fast-and-loose pulleys or the diameters of the pulleys driving same, or by altering the diameters of both, or in any other convenient way.

The cage or the end plates carrying the treated material is transferred from the machine or apparatus to an open box like truck provided with suitable guides to receive the cage and both the false bottom and the guides on the truck and also the end plates and both sets of guides on the machine or apparatus and the truck are preferably made by means of runners or anti-friction rollers in order that the cage in its telescoped or collapsed state or the end plates can readily be transferred to the truck.

The illustration is an end view, showing the bottom part of the front end frame broken away and the upper part of the tank or vat in section, and showing the parts in the operative position.

Referring to the drawing, 2 designates the tank or vat, 3 the lattice or the like top and 4 the perforated or the like false bottom. 5 is the inner cage divided horizontally into sections 6 fitting each other and connected together telescopically with the top section 6a preferably on the outside. The top section 6a is connected to the lattice top 3 by means of pins 3a engaging holes in said top section, and the lattice or other top 3 is fixed within the top of the tank or vat by pins 2a engaging holes in the sides of the tank or vat, and a horizontal set of holes in the vertical strips 3b. The lattice top is adapted to be raised and lowered by means of a cross shaft 85 journaled in bearings in the side frame or brackets secured thereto. The shaft is rotated by means of two crank handles 86, one at each end thereof. A flexible chain or wire rope 87 is connected to each of the metal strips or rods 3b secured to and supporting the lattice top, said chain passing over a guide pulley pivoted to a fixed bracket on the side beam, the chain being connected at its opposite end to the cross shaft 85 or a drum secured thereon. The lattice top is prevented from descending when in a raised position by means of a ratchet and pawl arrangement 89. The cage rests on the false bottom 4 and when in its working state the top section 6a is connected by means of pegs or other suitable means to the lattice or the like top 3 which is fixed within the top of the tank or vat 2. In operation the cage and the material contained therein are compressed against the stationary lattice or the like top during the slow up-stroke or lift of the false bottom and both the cage and the material contained therein are allowed to open out during the quick down-stroke of the false bottom and the material is further allowed to open out or expand during the dwell of the false bottom at the bottom of its stroke. The cage is composed of perforated sheet metal, copper or galvanized iron, connected together in sections 6 by means of strips 7 of angle iron and countersunk head rivets and the sections are limited in their sliding movement by means of beadings 3 at the top and the bottom of each section. The perforated bottom of the cage is made in two halves or doors 9 slideably mounted and

provided with handles 10 at their outer ends to facilitate the drawing apart of the doors so that the treated material may fall out of the cage into a convenient receptacle. The cage is supported on the false bottom and on suitable rail guides provided over the top of the truck by means of runners or anti-friction rollers 14 in order that



the cake can readily be run off the false bottom on to the rail guides, or vice versa. The runners or anti-friction rollers are mounted in the bottom of the cage at opposite sides of same and the doors 9 are provided with strengthening pieces provided also with anti-friction rollers 16 which are in contact with the false bottom 4 so that there is less liability of the bottom of the cage bulging out when the material is under compression.

#### Method of Coating Fabrics

(1,405,198; January 31, 1922)

DANIEL D. FROTHINGHAM and RALPH U. SAWYER, Winchester, Mass.

The object of this invention is to produce a coated fabric of improved quality and at reduced cost. The drawing illustrates a transverse section of two coating applying rolls, showing the fabric entering from one side and passing down between the rolls, in the nip of which the coating is applied by roll pressure.

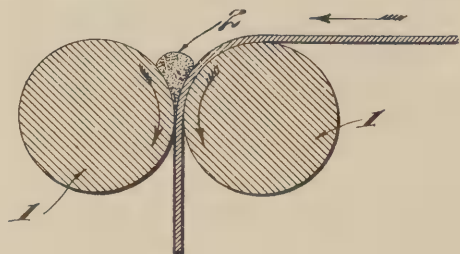
The coating consists of any usual fabric coating material and may conveniently be made of celluloid and a solvent, and will, in preferred form, contain pigmentous material as distinguished from soluble coloring material.

Heretofore coatings of this character have been applied to fabrics by the use of a "spreader" or by use of



rolls arranged vertically one above the other, between which the cloth is passed, and on the upper surface of which, at the nip of the rolls, the coating material is applied. This coating material gathers in a roll at the nip, the pressure of the rolls upon each other determining the thickness and degree of impregnation of the fabric by the coating. In such former process, the action of the coating rolls upon the coating material as the fabric is passed through the rolls has been such as to separate a portion of the solid pigmentous material from the coating, with the result that the coating applied to the fabric has been deficient in pigment. This detracts from both the value and appearance of the finished product. The phenomenon appears to be due to the force exerted by the rotating rolls or spreader upon the solid particles of pigment causing the latter to be moved rearwardly through the fluent coating and in a direction from the nip of the rolls. This method has produced a coated fabric wherein the coating contains less pigment than is desired.

Inventors declare that if the cloth moves down between the rolls, or down against the face of a spreader bar, the action of gravitation upon the solid particles of pigment has resulted in their being carried into the nip between the rolls, or, by the spreader bar, so that the pressure actually drives the coating into the fabric and the latter contains the same amount of pigment originally carried



by the coating material. Thus, when the coating rolls 1, 1 are arranged with axes in the same horizontal plane as shown, the action of gravitation upon the pigment in the coating material 2 at the nip of the rolls causes the pigment to be drawn in between the rolls with the fluent portion of the coating material. This method is particularly adapted for use in applying the coating by a rapid passage of the cloth between the coating rolls, in which case the fluent portion of the coating material is in a free-flowing condition as distinguished from a stiff or viscous condition, although it is also useful in the application to fabrics of coating in a stiff or viscous condition, as it has been found that even in such a stiff or viscous coating material the particles of pigment are assisted in their movement by gravitation.

In the illustration, the cloth approaches the rolls in a horizontal plane and passes around one roll and down between the two rolls, through the nip of the rolls, where the coating is applied.

While the method is more especially adapted, as has been indicated, to coating cloth with solid-pigment-bearing coating material, it is also adapted to the coating of

cloth with coating material containing only soluble coloring matter, because the action of gravitation upon the nip of the rolls increases the penetration of the material into the fabric.

The method is especially adapted for use in applying thin, as distinguished from thick, layers of coating to fabrics, a considerable portions of the coating material actually penetrating the surface of the cloth in the operation of coating.

The resulting product is one in which the coating is firmly united with the fabric and in which the surface of the coating being so small a distance from the surface of the fabric, the coated material is capable of being bent in a direction to stretch the coated surface without the fracture of the surface. In ordinary pigment-bearing coatings, the coating, being farther removed from the surface of the fabric, is liable to be cracked by bending the coated surface convexly.

### Dyeing Machine

(1,405,341; January 31, 1922)

ADAM W. SEHN, Cincinnati, Ohio

In the process of dyeing many delays occur, the dyeing is done unevenly and what are known as "heat wrinkles" are present in the work; loss being incurred, as many of the defects are not always noticeable until the dyed work is being pressed.

One of the salient features of this invention consists in the use of a paddle wheel formed and constructed in such manner that its blades strike the dye liquor in the tank, and which prevents the "carrying over" of goods in the dye tub. The paddle wheel also prevents tearing and bunching of the garments, and permits the dye liquor to readily run off the paddles or blades, thus insuring superior action and operation.

Another feature consists in providing a series of conveniently disposed pipes for steam, hot water and cold water, so that any of them can be used separately or jointly at any time.

The illustration is an isometric view of the machine.

The dyeing tub is marked 1, and is usually oval in configuration, and in its center is placed an oval, hollow upright post or fixture 2, an oval path being present between the post 2 and the wall of the tub 1, to form a route or passageway for the goods which are being dyed; the walls of the hollow post 2, provided with openings, which pass therethrough; and as many of these openings may be used as desired, a pipe 5 passes down into the hollow post 2 until it reaches the bottom, where it passes through the wall forming said hollow post extending out to form a nozzle provided with holes. With the pipe 5 are connected, at its upper extremity, the pipes 9, 10, 12; the pipe 10 may be a continuation of the pipe 5, these pipes are each governed by a valve 13, each pipe having such a valve.

One of these pipes is used for steam, another for hot water and the other for cold water, so that any can be used when occasion requires.

On the shaft 14 is mounted and supported a paddle

wheel formed of a hexagon hub provided with paddles or blades. A bracket 19 consists in holding up the bearing. There is further provided an upwardly extending bracket arm 20 having a supporting arm. The bracket arm 20 at the base of which is the bearing in which the shaft 14 is journaled, extends therethrough and a large gear is fastened thereon, a smaller gear which meshes with the first mentioned being placed on another shaft, the tight and loose pulleys 25 and 26 being placed on the same shaft.

A shifter rod 27 is provided with fingers 29 and 30 and the belt can be shifted to the right or left onto pulleys 25 or 26, as needed. The gears are covered by a guard 31.

The machine operates as follows: The dyeing liquor is placed in the tub or receptacle 1; the belt is shifted to a proper pulley and this revolves the shaft within them, thus revolving the small gear, which, meshing with the large gear, revolves the shaft 14, which carries around the paddle wheel; blades of which strike the dyeing liquor at any desired point; the blades 18 of the paddle wheel striking the dyeing liquor forces it around the path between the walls of the tub 1, and the hollow post 2; the paddle wheel revolving in the direction shown by the arrow. The dyeing liquor is thus kept in the state of agitation and in a revolving course over the path; the articles, clothes or other things to be dyed also pass over this course carried along by the dyeing liquor and the paddles 18 of the paddle wheel; hot or cold water or steam can be run into the hollow post, through pipe 5 as desired, and it will pass out through holes in the base of pipe 5, in the same direction as the dyeing liquor is running; the hollow post 2, having a multiplicity of holes to allow the proper circulation.

The hub of the paddle wheel is hexagon in shape, so that the blades or paddles 18 thereof are placed on the hexagon sides of said hub; this enables the dyeing liquor to quickly pass off of the blades when said paddles are in their upward course, and also enables any articles, clothes, fabrics or the like which have been caught up by the paddle wheel to quickly and readily fall off, back in the dyeing liquor, preventing any tearing of the articles or clothes and preventing bunching; thus more thoroughly allowing the dyeing liquor to produce its proper and expected result in dyeing the clothes or the like.

The edges of the blades of the paddle wheel are usually rounded, but may be made in any other shape or contour which will give the result desired, and it may be revolved in any other desired manner.

It will readily be observed that by use of the dyeing machine a continuous, uninterrupted and efficient operation results, thus quickly and thoroughly dyeing the clothes or other articles operated upon, assuring high class dyeing and preventing variety or shape of color, producing uniformity of color and evenness of the work done.

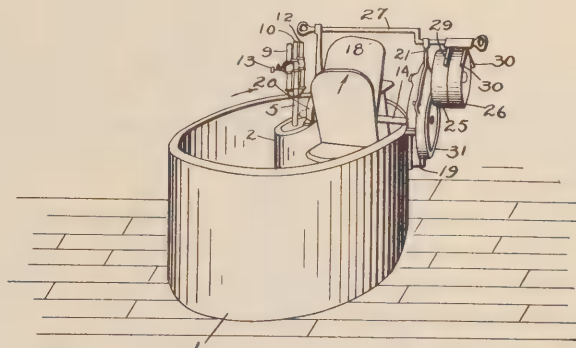
The following claims are granted:

1. A dyeing apparatus including a tank having an unobstructed annular chamber adapted to contain dye liquid,

and a rotatable paddle wheel for circulating said liquid around said chamber, said wheel having blades disposed tangentially to the axis of rotation.

2. A dyeing apparatus including a vat having an endless unobstructed chamber therein designed to contain dye liquid, and a rotary paddle wheel for circulating the liquid around said chamber having blades arranged tangentially to the axis of rotation of the paddle wheel.

3. A dyeing apparatus comprising a tank provided with an endless unobstructed chamber designed to contain dye liquid a horizontally disposed shaft, and a paddle wheel mounted on said shaft and provided with paddles dis-



posed tangentially to the axis of said shaft, said wheel extending into said chamber for circulating the liquid around said chamber.

4. A dyeing apparatus including a tank having an open top and provided with an endless chamber, a central chamber arranged within the other chamber, a supply pipe extending through the central chamber and having an angular extension projecting into the endless chamber and provided with apertures arranged at one of its sides and a paddle wheel for circulating the dye liquor around said endless chamber.

5. A dyeing apparatus including a tank provided with an endless unobstructed chamber designed to contain dye liquid, a horizontal shaft, a hub mounted on said shaft and having a hexagonal periphery, and paddles fixed to the faces of the hexagonal periphery and arranged tangentially to the axis of said shaft for circulating the dye liquor in the tank.

#### Vat Dyestuffs and Process of Making Same

(1,405,446; February 7 1922)

JULIUS SCHMIDLIN, Basel, Switzerland, and WALTER BRUNNER, Mainkur, near Frankfort-on-the-Main, Germany

Inventors have found that valuable vat dyestuffs of very useful dark shades, having a great affinity for the animal fiber, are obtained by heating in aqueous or alcoholic solution with alkaline sulphides to advantage with ammonium sulphide (preferably under pressure) the m-nitroarylides of the halogenated benzoquinones. This observation is all the more surprising as benzoquinone-o-nitranilide is converted with ammonium sulphide into quinone-homofluorindine (Berichte 23. 2793) a sub-



stance, representing a dyestuff insoluble in alkali and hydrosulphite and thus not applicable as vat color.

As starting materials for the new process the products may be used which are obtained in the usual manner by condensation of the halogenated benzoquinones with a m-nitroarylamine as m-nitraniline or its substitution products, for instance chlor-m-nitraniline, m-nitrotoluidine, m-nitrophenetidine (the nitro group always being in m-position to the amino group). According to the nature of the nitroarylamine and likewise according to the alkaline sulphide used as sulphurizing agent, and according to the temperature and duration of the reaction the shades obtained vary from brown to greenish to blackish brown.

The new dyestuffs are dark powders insoluble in water and in most organic solvents. They show a characteristic coloration with sulphuric acid, yielding violet to blue to greenish blue shades. With alkaline hydrosulphite yellow to brownish yellow colored vats are obtained, from which wool is dyed in very fast shades.

The process is illustrated by the following example:

Ten parts of chloranil-m-nitranilide (obtained by condensation of chloranil with m-nitraniline) are introduced into 250 parts of aqueous ammonium sulphide and the whole is heated for some hours to about 120 deg. Cent. After cooling down the dark precipitate is filtered off and washed with water. The new dyestuff thus obtained dissolves in concentrated sulphuric acid with a violet blue color and forms with alkaline hydrosulphite a yellow colored vat from which wool is dyed full grayish brown shades.

The same starting material yields an intensely greenish brown dyestuff by heating one part of it with a solution of 6 parts of crystallized sodium sulphide in 20 parts of water and precipitating with acids the dyestuff formed after several hours' boiling.

The chloranil-m-nitranilide being replaced by the same quantities of the condensation products of chloranil and chlor-m-nitraniline ( $\text{Cl}:\text{NO}_2:\text{NH}_2=1:2:4$ ), or nitrophenetidine ( $\text{OC}_2\text{H}_5:\text{NO}_2:\text{NH}_2=1:2:4$ ) and being heated with an aqueous or alcoholic solution of ammonium sulphide similar dyestuffs are obtained dyeing wool from the vat brown respectively blackish brown shades.

Claims are granted as follows:

1. The process of manufacturing new vat dyestuffs by heating with alkaline sulphides the m-nitroarylides of the halogenated benzoquinones (obtained by condensation of the halogenated benzoquinones with m-nitroarylanines).

2. The process of manufacturing a new vat dyestuff by heating with ammonium sulphide under pressure the chloranil-m-nitranilide (obtained by condensation of chloranil with m-nitraniline).

3. As new products the hereinbefore described new vat dyestuffs obtainable by heating with alkaline sulphides the m-nitroarylides of the halogenated benzoquinones (obtained by condensation of the halogenated benzoquinones with m-nitroarylamines), said dyestuffs being dark powders insoluble in water and in most organic solvents, soluble in concentrated sulphuric acid with a violet to a

blue to a greenish blue color and dyeing wool from the vat shades varying from brown to greenish brown to blackish brown shades of great fastness and intensity.

4. As a new product the hereinbefore described new vat dyestuff produced by heating with ammonium sulphide under pressure the chloranil-m-nitranilide (obtained by condensation of chloranil with m-nitraniline), said dyestuff being a dark powder insoluble in water and most organic solvents, soluble in sulphuric acid with a violet blue color and dyeing wool from the vat full grayish brown shades of great fastness and intensity.

### Azo Dyes

(1,405,687; February 7, 1922)

RUDOLPH HAUCWITZ, Friedrichshagen, near Berlin, Germany (assignor to Actien Gesellschaft fur Anilinfabrikation, Berlin).

This consists of new azo dyes derived from a diazo compound and an 8-hydroxy-derivative of quinoline, for instance of 8-hydroxyquinoline-sulphonic acid made by sulphonating 8-hydroxyquinoline. As diazo-compounds most adapted are those which are derived from aminoaryl-sulphonic acids of the benzene series. The manufacture is executed in the known manner by coupling the components in an alkaline menstruum. The dyes thus prepared are brownish powders which dye wool from aqueous solutions orange tints becoming fast to washing and milling when treated with chromic acid or chromates, yellow to brownish chromium lakes being formed. By strong reducing agents the dyes are destroyed.

Example:

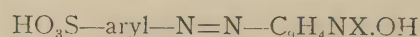
19.5 parts of sodium aniline-3-sulphonate are diazotized in an aqueous solution by means of 50 parts of hydrochloric acid of 112 deg. Be. and 7 parts of sodium nitrite. The diazo-compound is then mixed with an aqueous solution of 22.5 parts of 8-hydroxyquinoline-sulphonic acid and 30 parts of calcined sodium carbonate. After combination the dye is salted out and dried. It dyes wool orange tints. After treatment with potassium bichromate a reddish yellow dyeing is obtained.

Two of the four claims allowed are:

1. The new dyes forming on wool yellow to brownish chromium lakes and being sulphonic acids of the azo dyes which may be derived from a diazotized aromatic amine and 8-hydroxyquinolin and correspond to the formula:



2. The new dyes forming on wool yellow to brownish chromium lakes which may be derived from a diazo-aryl-sulphonic acid and an 8-hydroxy-derivative of quinolin and correspond to the formula:



where X means hydrogen or a substituent.

## Apparatus Employed in the Manufacture of Artificial Silk

(1,406,153; February 7, 1922)

JAMES CLAYTON, Coventry, England (assignor to The Viscose Company, Marcus Hook, Pa.)

This relates to machines employed in the manufacture of artificial silk, the said machines being of the kind operating in accordance with what is known as the Topham system wherein viscose, or the like, is ejected from a nozzle into a setting bath and the threads formed are led under an immersion guide and up over a rotating drawing-roller guide (known as a Godet), and then down through a thread-guide, or funnel, into a rapidly rotating spinning-box in which the thread is coiled, the circumferential velocity of the rotating drawing-roller guide, or Godet, determining the rate of passage of the thread into the spinning-box.

Inventor has found that the operation of initially passing, or threading, the thread through the thread-guide, or funnel, is much facilitated, especially in cases where it is desired to run the machine at a high speed, if means be provided whereby the thread is, during the threading operation, subjected to the action of a drawing-roller guide, or Godet, which has, during such operation, a circumferential velocity slower than that which the drawing-roller guide or Godet has when the thread is passing thereover on its way to the spinning-box during normal working of the machine. This invention is adapted, for instance, for use in an apparatus in accordance with inventor's application, Serial No. 309509, A. D. 1919, for Letters Patent, in which apparatus, the ordinary drawing-roller guide, or Godet, can be run so much more quickly than is done in ordinary machines that, without some provision according to the present invention, the full advantage of greater speed of output will not be practically obtainable owing to the difficulty of passing the thread through the thread guides, or funnels, when the drawing-roller guides, or Godets, are running at high speed.

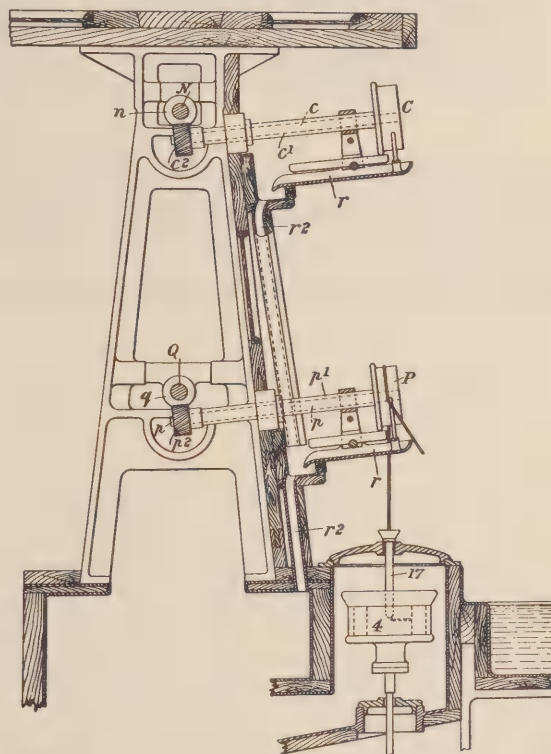
The drawing shows, in vertical transverse section the upper part of a machine to illustrate the application of this invention thereto when there is employed an additional Godet, upon a shaft separate from that of the ordinary Godet, over which the thread passes, through the thread guide, or funnel, and into the spinning-box when the machine is normally at work.

The spinning box is marked 4 and the thread guide or funnel is marked 17. The ordinary Godet is marked C and is shown as being driven by a scroll wheel *n* on the shaft N, engaging a scroll wheel *c*<sup>2</sup>, on the shaft *c*, of the Godet C, which shaft *c*, is carried in the long tubular bearing *c*<sup>1</sup>.

P is an additional Godet, provided in accordance with the present invention. It is shown as being mounted on the shaft *p* (carried in the long tubular bearing *p*<sup>1</sup>) which has on it a scroll-wheel *p*<sup>2</sup> which engages with a scroll-wheel *q*, on a shaft Q, which is driven by any suitable gear at a slower circumferential speed than that at which the Godet C is driven. This can, for example (assuming

the Godets C and P to be, as shown, of equal diameter), be conveniently effected by reducing gear conveying motion from the shaft N to the shaft Q, or, if desired, the additional Godet P can be of a diameter so much smaller than the diameter of the ordinary Godet C, that the Godets C and P can be driven at the same speed and have the desired difference in rate of circumferential velocity.

Satisfactory results are obtainable if the Godet P be driven at a circumferential velocity of 125 feet per minute and the Godet C at a velocity of 250 feet per minute.



When thread is to be passed through the thread-guide or funnel 17, to the spinning-box 4, the said thread is passed over the slow moving Godet P and can then be much more readily threaded through the said guide, or funnel 17, than would be the case if the thread were passed over the quick moving Godet C. After threading (which may be done in the usual way) is effected, the thread is transferred from the Godet P, to the Godet C, and coiling of the thread into the spinning-box proceeds.

The troughs *r* and channels *r*<sup>2</sup> are for carrying liquid which drips from the Godets, into the space below and thence away to any suitable receptacle.

## Method for Determining the Quantity of an Appropriate Chemical That Should Be Added per Unit of Volume of Water in Order to Fit It for Use in the Arts

(1,405,940; February 7, 1922)

CYRUS WILLIAM RICE, Philadelphia, Pa.

Some water contains what is called temporary and permanent hardness, and it is customary to treat such water by the addition of chemicals adapted to remove or absorb the hardness so as to fit the water for use in boilers and



for other purposes. The hardness of a supply of water frequently changes, so that it is often necessary to ascertain at comparatively short intervals of time how much of the appropriate chemical should be added to correct the changing hardness of the water.

The principal object of the present invention is to provide a method of ascertaining the quantity of chemical required to remove temporary and permanent hardness from water which is so quick and easily practised that even comparatively unskilled persons can make the ascertainment in a very short time and so insure proper treatment of the water supply.

Generally stated, the method of ascertaining quantity of an appropriate chemical required to remove the temporary and permanent hardness as it exists from time to time in a given water supply consists in treating a measured sample of the water with an appropriate chemical for removing temporary and permanent hardness, using such chemical in excess under heat control and determining quantitatively the unused quantity and change nature of such chemical.

Free or half bound carbonic acid present as bicarbonate is usually referred to as temporary hardness, and sulphates of calcium and magnesium are usually referred to as permanent hardness.

In practice there is added to a measured quantity or sample of the water to be treated sodium carbonate or potassium carbonate, which are equivalents, in excess of the quantity required to destroy or absorb any permanent and temporary hardness that might possibly be present. For example, to one hundred cubic centimeters of water there is added five cubic centimeters of one-fifth normal solution sodium carbonate or its equivalent. The sample may then be boiled in a bath. This promotes the reaction. Thereafter the sample is filtered. The result of this is that calcium and magnesium sulphates are converted into carbonates and precipitated, thus removing though not ascertaining the quantity of the permanent hardness from the sample, and that sodium bicarbonate and sodium sulphate are formed and are present in the filtrate along with sodium carbonate. It may be remarked that sodium bicarbonate in the presence of excess sodium carbonate is stable even when the solution is boiled within a water bath. The filtrate containing sodium as bicarbonates and carbonates and also sodium sulphate, is titrated with the same mineral acid, as sulphuric acid or hydrochloric acid of known strength or standard solution, first against an indicator of the phenolphthalein class which is peculiarly sensitive to carbonic acid, until the color of the indicator is destroyed, and then against an indicator of the cochineal class, which is more sensitive to alkalinity than indicators of phenolphthalein class. The quantity of acid required in the phenolphthalein titration does not exactly correspond to the quantity of sodium carbonate present but must be multiplied by two, so that twice the quantity of acid represents the quantity of carbonates introduced into the water and unused in any of the reactions. The quantity of acid required in the cochineal titration minus twice the quantity of acid used in

the phenolphthalein titration represents the quantity of carbonate of sodium used to replace the calcium or magnesium bicarbonates originally present in the sample of water and so is a measure of the temporary hardness. The total amount of carbonate of sodium originally introduced minus the quantity of acid used for the cochineal titration, which represents the unused carbonate of sodium and the amount of carbonate of sodium used to replace the calcium and magnesium bicarbonate originally present in the water, represents the quantity of carbonate of sodium used in the reaction by which the permanent hardness was precipitated. For example, let  $z$  indicate in terms of acid the total amount of sodium carbonate or hardness removing chemical, and  $x$ , the amount of acid used in the first titration, and  $y$ , the amount of acid used in the second titration. Then  $y - 2x =$  temporary hardness and  $z - y =$  permanent hardness. In the described process neither the temporary nor permanent hardness were actually determined save by the above calculation. Another way of expressing the same facts is to say that  $2x =$  the quantity unused,  $y =$  the quantity unused and the quantity used in destroying temporary hardness, and  $z =$  the total quantity used.

A very important part of the method directly influencing the results is the use of carbonate of sodium in excess with heat under the definite control of a water bath. The use of a water bath permits a rapid absorption by the carbonates of sodium of the half-bound carbonic acid gas from its loose combination with the carbonates of calcium and magnesium and also of the carbonic acid gas as it exists free in the water and forms by these means the bicarbonates of sodium. The carbonates of sodium under the heat control of a water bath act as a carrier for the elements causing temporary hardness. The determination is in terms of quantity of acid or standard solution used and from this chemists can calculate or ascertain the quantity of an appropriate chemical, as carbonate or hydrate of sodium or potassium or their equivalents that should be added per unit of volume of the supply to free it from both the permanent and temporary hardness. In actual practice inventor simplifies the commercial application of his process by providing a chart graduated to show how much by weight of an appropriate chemical or chemicals is to be added to each unit of volume of water for various increments in volume of mineral acid or standard solution used in the manner described. Phenolphthalein and cochineal are examples of substances adapted to operate in the manner described in the volumetric analysis above explained. The feature of the invention is the use of sodium or potassium carbonate in quantities sufficient to destroy in the water, being tested, both the sulphates of lime and magnesia and also absorb without their disassociation by heat all free or half-bound carbonic acid gas contained in waters as carbonic acid or the bicarbonates of lime and magnesia, the resulting carbonates or bicarbonates of sodium or potassium indicating through a single acid titration the temporary or permanent hardnesses to be overcome in order to fit the water for use in the arts.

TEXTILES

PAPER

LEATHER

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

MARCH 27, 1922

NUMBER 7

## FEATURES OF THIS ISSUE

Part I of "The Piece Dyeing of Ladies' Dress Goods and Coatings with Acid Colors" discusses suitable dyestuffs, the general theory, and treatment of goods before dyeing.

Raffaele Sansone contributes a useful article on "Dyeing Cotton Cloth in Cold and Slightly Warmed Baths with Direct Coloring Matters."

In "Fastness to Light," E. W. Pierce tells of the difficulty of establishing standard quantitative exposure tests, even with ultra violet light.

Proceedings of the A. A. T. C. C. include the fifth Council meeting, the fourth Research Committee meeting, and "The Development of Tests for the Fastness of Dyestuffs," by Wallace J. Murray.

List of Foreign Dyes Licensed for February Import.

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PAINTS

INKS

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## The Piece Dyeing of Ladies' Dress Goods and Coatings with Acid Colors

### Part I

Department Store Apologists for American Dyes Are No Longer on Safe Ground—Suitable Colors—Theory of Acids and Glauber's Salt—Treatment of Goods Before Dyeing

By B. T. C.

#### IN GENERAL

THE dyeing of ladies' dress goods and coatings, especially into the numerous mode shades so popular with the women of to-day, calls for a great deal of knowledge and skill on the part of the dyer. Not only must he consider the dyestuffs and chemicals used in the operation, but the quality of the yarn, and weave construction as well. The dyeing of Bolivia cloth, for example, is an entirely different proposition from the dyeing of a piece of Poirer twill, and any dyer who attempts to treat such widely differing fabrics according to one and the same procedure sooner or later gets into trouble.

Acid colors are almost wholly used for the piece dyeing of worsted dress goods, due probably to the ease with which they may be applied to the wool fiber and to the comparative simplicity with which color additions may be made to bring the batch up to standard. Wool fiber seems to have a natural affinity for acid colors, acting as a base and forming more or less insoluble color lakes with them. However, these lakes vary in fastness, depending upon the dyestuff used. Orange GG, for instance, is very fast to light, is not sensitive to acids or alkalis, but is only fairly fast to washing. On the other hand, the sulphone cyanins possess excellent fastness to light, washing, milling, acids, alkalis and stoving.

In these modern times we hear a great deal about the term fastness, due perhaps to the recent agitation of the American press. In the past it has been more or less the policy of many retailers to say to a customer when selling a piece of goods or a suit, "Sorry, but we cannot guarantee these colors as they are dyed with a domestic product." While that excuse was no doubt reasonable enough during the war, such certainly is not the case today. Gradually the list of available dyestuffs has been augmented until at present the market contains any number of colors of the required fastness. If they are not being used it is due either to the neglect of the dyer or

to a mill policy of securing the desired shades with the cheaper but more fugitive dyestuffs. Naturally enough the tests for fastness for ladies' dress goods are less severe than for men's wear, but nevertheless the shades dyed must give the customer satisfaction.

#### COLORS SUITABLE FOR DRESS GOODS

We will quote a list of colors which are available on the American market to-day and which are suitable for such work as the dyeing of ladies' dress goods:

##### *For Navies:*

Wool Blue CB and CG.  
Wool Green (various marks).  
Azo Fuchsine 6BN.  
Fast Light Yellow 3G.  
Wool Orange GG Crystals.

The above list of colors will produce any shade of navy that may be desired. All the dyes are extremely level dyeing. If greater fastness is necessary navy shades may be had with the following colors, although care must be taken in the dyeing operation:

Buffalo Fast Blue R.  
Fast Wool Violet B.  
Fast Wool Cyanone R and 3R.

##### *For Greens:*

Acid Green L.  
Fast Acid Green B.  
Patent Blue A or V.  
Tartrazine.  
Fast Crimson GR or R.

##### *For Browns:*

Tartrazine.  
Fast Crimson GR or R.  
Patent Blue A or V.  
Wool Orange A.  
Alizarine Sapphire SE.



*For Reds, Crimson, Clarets, Etc.:*

Fast Crimson GR or R.  
 Azo Fuchsine 6B.  
 Acid Red 4B  
 Patent Blue A or V.  
 Tartrazine.  
 Wool Orange GG, crystals.

*For Violets:*

Wool Violet 4BN.  
 Azo Wool Violet 4B.  
 Patent Blue A or V.  
 Fast Crimson GR or R.  
 Fast Yellow 3G.  
 Alizarine Sapphire SE.

*For Blacks:*

Buffalo Black NBR.  
 Amido Naphthol Black 3BL.  
 Buffalo Black 2SB.  
 Buffalo Black 4AB (acetic acid).  
 Tartrazine.  
 Wool Orange A.

*For Mode Shades:*

Nearly any mode shade under the sun may be produced if the following dyestuffs are used:

Patent Blue V or A.  
 Alizarine Sapphire SE.  
 Alizarine Sapphirole B.  
 Fast Crimson GR.  
 Azo Fuchsine 6BN  
 Fast Light Yellow 3G.  
 Wool Orange GG, crystal.

The colors named have stood the test of usage and with proper control give satisfaction to all concerned. These colors are level dyeing, penetrate well and possess the necessary fastness requirements for such goods as the type with which we are now dealing.

## THE THEORY OF THE USE OF ACIDS AND GLAUBER'S SALT

In order that the dyer may fix the so-called acid colors on wool, an acid bath is required. This fact, as a rule, has been explained by the supposition that acid is necessary in order to set free the color acid and enable it to combine with the wool. Further investigation has shown that part of the wool itself undergoes a chemical change due to the presence of acid, probably forming lanuginic acid. Knecht, for instance, has demonstrated the effect of acid upon the wool fiber by the following experiment: Wool is boiled with 10 per cent of its own weight of sulphuric acid and then boiled out a number of times with water until the last wash water shows absolutely no traces of acid when methyl orange is used as an indicator. If the wool so treated is then placed in a beaker containing 2 per cent of any acid color, such as Crystal Scarlet, without the addition of any acid whatever and boiled the fiber is dyed a full shade. One investigator advances the be-

lieve that lanuginic acid contains both acidic and basic groups in its molecule and that it is the basic group which is selected by the color acid, forming the color lake. Then as the temperature is raised gradually to the boiling point, this chemist believes that more and more lanuginic acid forms and that the color acid unites with it until the bath is exhausted.

The acids commonly used in the dyeing of wool are sulphuric acid, acetic acid and, to a slight extent, formic acid. Niter cake or sodium acid sulphate also find extensive use in such work. The value of any acid for the fixation of colors from a dye bath depends wholly upon the hydrogen ion content, and as all textiles are affected more or less by acids, this content is of extreme importance. In the case of sulphuric acid ( $\text{H}_2\text{SO}_4$ ) the ion content is quite high. In using this acid dyers soon found that the wool fiber was weakened and that many colors were deposited unevenly in the wool due to the great strength of the acid. When using  $\text{H}_2\text{SO}_4$  with suitable colors, 2 to 4 per cent, depending on the shade, is generally sufficient to exhaust the bath.

Sodium acid sulphate acts in a very similar manner to sulphuric acid, although its action is much slower. It is because of the latter reason that dyers use niter cake, as it is often called, to exhaust the dye bath, especially for goods which are difficult to penetrate. The chemistry of the use of sodium acid sulphate is quite interesting. As the temperature of the bath is raised gradually to the boil the niter cake breaks up into Glauber's salt and sulphuric acid, according to the following reaction:



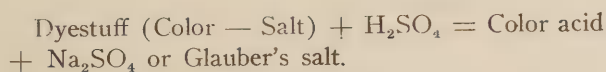
As the sulphuric acid is formed it aids in the exhaustion of the bath. This means of exhausting the bath is very popular with some dyers who use from 5 to 10 per cent  $\text{NaHSO}_4$ . It is no doubt true that  $\text{NaHSO}_4$  has many advantages that  $\text{H}_2\text{SO}_4$  does not possess. In the first place, in the use of vitriol there is always the danger that due to carelessness of the workmen the acid may be spattered on the pieces as they revolve in the kettle, thus causing clouds. With  $\text{NaHSO}_4$  this can never happen, as it is added to the kettle in lump form. Second, niter cake, being a solid, is easier to handle. Third there is practically no danger from handling  $\text{NaHSO}_4$ , while many have been badly injured in handling the vitriol. And finally, the rate of exhaustion for niter cake is less than for sulphuric acid.

Knowing the harmful effects of vitriol upon the wool fiber, dyers attempted to use acetic acid ( $\text{CH}_3\text{COOH}$ ) in its place. Good results were secured with acetic acid colors, but in many cases it was found that the exhaustion of the bath was a hard thing to accomplish with acetic alone. In other words, the hydrogen ion content was too low for the acid to be fully effective. Therefore, in order to complete the exhaustion the dyer had to resort to a further addition of vitriol, the use of which was just what he originally hoped to avoid. Usually from 5 to 10 per cent acetic acid is used. One method that has brought good results to many is to start the bath with

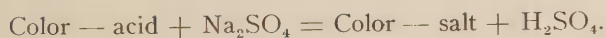
5 per cent acetic acid and adding gradually 3 to 6 per cent  $\text{NaHSO}_4$  as the bath is being raised to a boil.

Of late years a great deal has been written in regard to the use of formic acid in dyeing. There is no doubt but that this is the acid of the future and that the price alone has hindered its general adoption by the trade. Formic acid ( $\text{HCOOH}$ ) has one distinct advantage over  $\text{H}_2\text{SO}_4$  in that its hydrogen ion content is less than that of the mineral acid, and yet it is fifteen times stronger than acetic acid. In other words, 1.086 per cent of  $\text{HCOOH}$  is just as effective as 16.36 per cent  $\text{CH}_3\text{COOH}$ . Lately it has been claimed by the manufacturers that dyeing with formic acid is cheaper than dyeing with acetic acid and subsequently exhausting with oil of vitriol. It has also been claimed that  $\text{HCOOH}$  produces better penetration, more even dyeing, brighter shades and has a much less tendering action on the fiber.

We now come to the use of Glauber's salt ( $\text{Na}_2\text{SO}_4$ ) in the dye bath. When added to the bath this chemical exerts a retarding action on the process, thus bringing about more level dyeings. It also has a stripping action on acid colors after they have been fixed on wool fiber. Many theories have been advanced explaining its action during dyeing. Some claim that the action of the sulphuric acid is retarded by the Glauber's salt and thus the tanuginic acid is not formed so readily with consequent slowing up of the dyeing process. Others use the following equation to bear out their theory:



They contend that as Glauber's salt is produced by the action of the acid upon the dyestuff, by adding more Glauber's salt its mass is increased and that this will tend to reverse its action as follows:



It has been said that too much Glauber's salt can never be used, but for ordinary purposes 20 per cent is sufficient. A good grade of salt should be used, and should be as free as possible from iron.

#### TREATMENT OF GOODS BEFORE DYEING

Systems in mills vary, but as a rule piece goods come to the dyehouse in one of two ways: either from the washhouse, in which case they are generally wet, or from the carbonizing department. When the pieces come from the washhouse they should be absolutely clean and free from soap. Scouring of piece goods has for its object the removal of all spinning oils added in previous operations as well as the warp sizing and dirt picked up and held mechanically by the fibers. If the emulsification and subsequent removal of these wool oils are incomplete cloudy and streaky dyeings are bound to be the result. It is important that all the warp sizing be removed during wet finishing, or streaky effects are apt to occur when the pieces are dyed. However, very little trouble will

be had by the dyer if a good grade of wool oil is used and if the finisher sends his goods to the dyehouse perfectly clean. Goods which come from the washhouse are apt to be the heavier grades of woollens which for various reasons are carbonized before being fulled. This applies especially to velours, bolivias, cheviots and fabrics of a similar nature. Goods which contain cotton threads in the selvedge or whose warp contains cotton also come direct from the washhouse. Occasionally light-weight dress goods which are to be dyed light shades are not carbonized, in which case they also come to the dyer from the wet finisher.

The goods that come from the carbonizing department are generally light-weight fabrics and usually come unneutralized. It might be well at this point to emphasize the need of good work in carbonizing in order to secure good results in the actual dyeing itself. The well-known "resist" has caused no end of trouble throughout the trade. Another point is the fact that uniform saturation with sulphuric acid is absolutely essential, for if the distribution of acid is uneven, uneven results automatically appear in the pieces and are apparent only after the goods have been dyed. This is due to the fact that wool undergoes a certain change in its affinity for dyestuffs during carbonization and naturally places which hold more sulphuric acid will dye different depths of shade than parts holding less. This is a fact that is often overlooked.

When the goods are received in the dyehouse it is a very good plan to examine all pieces that are to be dyed light shades for stains, oil spots and grease marks. If found to be free from such defects they are ready to be dyed, but if not should be turned at once into a navy or black or any shade that will cover the defect. This examination is often omitted, but is the best plan if many light colors are to be dyed.

The dyer may now treat the carbonized pieces in one of two ways. He may allow the sulphuric acid held by the fibers to remain in the cloth and dye with the addition of Glauber's salt and color only. This method is satisfactory if the dyer is absolutely certain of the level dyeing properties of his dyestuffs. The safest plan, however, is to neutralize the goods with ammonia at 110 to 120 deg. Fahr. After allowing goods to run for one-half hour wash off with cold water. Some dyers seeking to be especially careful wash the goods a second time with water at 110 deg. Fahr. and, after fifteen minutes, cool down. It is a very good plan to allow the carbonized pieces to run for some time in the cold water before adding the ammonia. This is especially true where pieces are still warm from the baking they received in the carbonizing oven. Naturally a heat reaction occurs when the ammonia reacts with the acid held by the cloth and unless this heat is controlled the wool fiber itself is apt to be injured. There is no necessity for neutralizing goods which are to be dyed black.

Occasionally uncarbonized worsteds which are to be dyed full shades and are to be speck dyed afterwards are placed in the kettle the afternoon before dyeing, although no water is added. This does not apply to light



shades. Usually, however, the pieces are placed in the dye kettles just before the dyeing is to take place. Velours, broadcloths or any fabrics that tend to develop

wrinkles during dyeing are, as a rule, tacked before being put into the machine.

*(To be concluded.)*

## Dyeing Cotton Cloth in Cold and Slightly Warmed Baths with Direct Coloring Matters

Colors Available for This Process—Methods of Application—Apparatus Employed—Small Batches of Goods—Operation of the Beam Dyeing Machine—Advantages of This Machine for Cold Dyeing—Jigger Dyeing and Its Advantages—Preparation of Solutions

By RAFFAELE SANSONE

THE processes for dyeing cotton cloth goods in cold or slightly warmed baths are no novelty, and some of them have been known for more than twenty years. The necessity of their application beyond certain limits, and for certain special purposes, was not, however, felt as long as the cost of the warming operations represented almost negligible figures, especially when dyeing was conducted on a certain scale, or together with other processes, such as the boiling out of cotton fabrics.

The case is quite different at present, however; for, owing to the high price of coal and to the danger, in the future, of a certain scarcity of this important fuel, the uses of which have increased enormously during and since the war; to the necessity of continually reducing the cost of dyeing to meet competition from every quarter; to the desire to avoid boiling baths, which complicate the turning operations and are the cause of the formation of fog in the dyehouse, and to the wish of many manufacturers to conduct the dyeing of fabrics on a certain scale without undergoing the expense of a boiler for the generation of steam—owing to these many factors the manufacturer of dyed cotton cloth goods finds it more and more difficult to make ends meet, and hence a means for overcoming his difficulties, like cold dyeing, is often very welcome.

### A FIRST APPLICATION IN THE DYEHOUSE

By the foregoing, however, it is not meant that it will be possible for a foreman dyer accustomed to dyeing in the warm to adopt at once, for the treatment of large batches of cotton cloth, a process that is quite new to him. He can, nevertheless, after a certain number of experiments conducted first in the laboratory on a small scale by a good chemist and then by himself on some yards of cotton cloth, try the treatment on a large scale in the works, preferably at first on a small batch of material. From the results thus obtained he can then proceed to the treatment of another small batch, and later to that of a large batch, conducting little by little the treatment of all his goods

with the new process or modification thereof to suit his needs.

### COLORS AVAILABLE

With the great development before and since the World War in the manufacture of synthetic products of all sorts, the dyer has at his disposal quite a large series of suitable colors, by the use of which he can obtain in cold or slightly heated baths the greater part of the shades he requires.

Among the above colors may be mentioned Erica BN, Erica GN, Brilliant Purpurine, Congo Rubine, Curcunine, Chrysophenine, the Chicago Blues, Columbia Blue R, Heliotrope 2B, certain brands of Columbia and Zambesi Black, etc.

### METHODS OF APPLICATION

When using direct colors, these are dissolved in warm water and the resulting solution is poured in the cold dye bath, containing, for every 100 parts of liquor, in the case of light shades from 0.2 to 0.5 part of sulphate of soda crystals and 0.5 part of green olive oil or white Marseilles soap. For colors of dark shade an addition of 0.5 to 1.5 parts of sulphate of soda crystals, 0.15 part of sulphonated olive oil or castor oil (Turkey Red oil), and a little carbonate of soda is made.

The properly boiled-out cotton goods are entered in this instance in the cold dye bath containing as little water as possible, moving in it from three-quarters to one and one-half hours, in accordance with the intensity of the shade desired. On taking out the cotton cloth goods from the bath they are slightly rinsed and then dried as usual. The baths in some cases are left in the same state of exhaustion as on a large scale.

### THE MACHINES EMPLOYED

The machines employed for dyeing cotton cloth goods in the cold have so far been generally those em-

ployed for dyeing in the warm. One of the most satisfactory arrangements for the purpose is undoubtedly the continuous dyeing machine, where the material is caused to pass several times through the dyebath contained in a shallow wooden vat while being run up and down on a double series of guiding rollers, the operation being greatly assisted if the upper guiding rollers are supplied with pressing cylinders. In this event the material comes into better contact with the dye solution than when dyed on the jigger, since the latter is obliged to enter and make its exit far more frequently. The dye bath must, however, be maintained always at the same strength by causing a fresh and somewhat stronger bath to enter in the contrary direction to that followed by the cloth running through, and to make its exit where the cloth enters, following which it can be used over again repeatedly after strengthening in each instance. Larger quantities of dye bath are required in this instance than when dyeing on the jigger, and this constitutes a marked disadvantage when very large batches of material are not to be dyed in one color.

#### DYEING SMALL BATCHES

For dyeing small batches of cotton cloth the beam dyeing machine can give very good results, owing to the fact that with this apparatus the dye bath is compelled to circulate continuously through the material, impregnating all portions over and over again with a comparatively small quantity of dye bath which can thus be exhausted if the nature of the color or mixture of colors used for its preparation allows it.

The construction of this machine is not very complicated. It consists principally of a long, narrow wooden or copper case, closed at one end and open at the other, before which can be fixed a tight-fitting copper door. The interior of the case is arranged for sustaining a strong copper beam, around which is wound one or two of the pieces of the cotton cloth to be treated. The core (or middle portion) of the beam is perforated and can be fixed at the closed end of the cylindrical case to a conical projecting tube terminating, on the outside of the said cylinder, in the body of a centrifugal pump which forces all liquid at the bottom of the cylinder upward. The central core is fixed at the other extremity to a projecting cone on the copper door already mentioned.

#### OPERATION OF THE BEAM DYEING MACHINE

The working of the plant is very simple. The whole of the dye bath necessary for the production of the required shade is entered, through the centrifugal pump and a special tube on its upper portion, in the dyeing cylinder in a quantity sufficient to fill the latter completely. The tube is then closed by means of a special tap and the operation of the pump continued so as to force the dye liquor repeatedly through the

material under treatment. Operation is continued as long as any coloring matter can be extracted from the dye bath. This may be determined by taking, from time to time, a sample of the dye bath through a small tap fixed on the body of one of the circulation tubes, pouring it into a large test tube, and observing it side by side with a sample taken a certain time before. When in this way it is observed that the solution loses no further color, the dyeing process should still be continued for some time. Upon completion the bath may be pumped into a separate vat and there stored for future dyeing operations, or, in the case of colors that exhaust completely, into the waste water main.

#### ADVANTAGES OF THE BEAM DYEING MACHINE FOR COLD DYEING

The advantages of the above apparatus cannot be overrated, and some of them can be considered as follows:

1. The material can be dyed in the wound form very uniformly with most colors dyeing in the cold.
2. The action of the dye bath can be prolonged at will for any amount of time, and even overnight if necessary, there being only a question of a small expense for motive power.
3. The employment of labor is very small, one workman being sufficient for preparing the dye baths for a whole series of apparatus dyeing different colors, while another may give his attention to the entering and taking out of the beams of material, to the winding on the beam of the pieces of cotton cloth, etc.
4. As the dye bath required is in small volume, it may be used in a fairly concentrated form, which assists the production of strong shades with some of the colors.
5. When the heating facilities permit and the dye baths can be obtained warm, the material can be treated during the cooling-down process.
6. For the better conservation of heat in the dyeing cylinders, these may be constructed with double wall enclosing a vacuum.
7. The heating of each single apparatus may be conducted to advantage through the use of an electric heater applied to the lower portion of the cylinder of treatment, or in the inside of one of the circulation tubes. This would allow the carrying out of the boiling-out and dyeing operations on some fabrics—and thereby give double value to the plant—when large-scale production is not required.
8. The space occupied by the dyeing plant is comparatively small, for many dyeing cylinders may be fixed in a frame so as to form several lines one above the other, the circulation pump being placed in each instance at their back.
9. Through the application of electric heating, the deepest shades may be produced and any direct color employed.



10. All classes of cotton fabrics may be dyed, from the frailest to the heaviest, etc.

### JIGGER DYEING

The jigger, under certain circumstances, also offers great advantages for the cold-dyeing of direct colors. The colors used in this instance should, however, be carefully chosen, for it must not be forgotten that the dye bath carried up by the cloth continues its coloring action while on the shafts between which it is unwound and wound. In this instance two pairs of pressing rollers to squeeze the different portions of the material just as these leave the dye bath, and before they are wound on the shafts, would be of great advantage, for in this way only a small quantity of dye bath would remain in the material and the principal dyeing operations would take place in the trough of the jigger itself.

### ADVANTAGES OF THE JIGGER

The advantages of the jigger for dyeing cotton cloth in the cold with certain direct coloring matters are several, and can be indicated as follows:

1. The operator can observe the fabric he is treating all through the dyeing operations.
2. The jiggers employed for warm dyeing operations can be employed just as they are, or with little modification, for dyeing the same material in the cold.
3. The saving in steam is considerable, if this is used in the works for other purposes.
4. Jigger dyeing in the cold can be adopted when no steam is available.

5. The production can be large or small, as may be required.

6. The knowledge gained by the foreman dyer in the preparation and use of the baths for warm dyeing is not lost, and a portion of it can be utilized in the cold dyeing operation.

7. The advantages of cold dyeing can easily be calculated in comparison with those of warm dyeing, as often no extra expense of plant is necessary.

8. The volume of the dye bath can be reduced, and the bath used as concentrated as possible or convenient.

9. The employment of labor can be somewhat reduced owing to the fact that the dyeing operations depend more on the movement of the material than is the case with warm dyeing, and the exhaustion of the baths can be made to take place simply through the passage of the material, unevenness being less likely than in the first case.

10. Dyeing with a continuous cold bath can be conducted with even greater facility than when employing hot liquors, etc.

### SOLUTIONS

The preparation of the dyestuff solutions requires simply the installation of a small iron or copper kettle, or boiler, heated by a wood, coal or gas furnace. Electric warming plants would also be useful in this case, such as are already employed in some works for increasing the amount of steam generated through boilers heated by coal.

## Fastness to Light

Chaos Exists in This Brand of Dyestuff Science—Reasons for Difficulty of Establishing Standard Conditions for Tests—Variability of Natural and Artificial Lights—Chemical Effects of Ultra-Violet Rays Which Decrease the Value of Tests—Suggested Apparatus for Quantative Exposure

By E. WALLACE PIERCE

**T**HERE is no subject connected with the dyestuff industry which is in such an uncertain state as that of fastness to light. Every other property of any given dye may be classified, compared and measured with a fair degree of technical accuracy excepting light fastness; and this is absolutely chaotic, despite the efforts that have been made to obtain a mode of procedure that will give universally concordant results.

The reasons are: first, the irregularity in the light and conditions under which the tests are made; and second, the lack of equality in the light resistance due to differ-

ent shades and strengths of the dyestuffs that are tested.

### FACTORS WHICH AFFECT LIGHT VALUES

Anyone who has practised amateur photography knows, from his exposure meter, what widely different values of sunlight must be taken into account as he goes from one latitude to another, from one season to another and how the presence of haze, clouds, etc., affect the sun's value from hour to hour. Of course, everyone realizes this and makes tests comparatively by exposing

(Continued on page 240.)

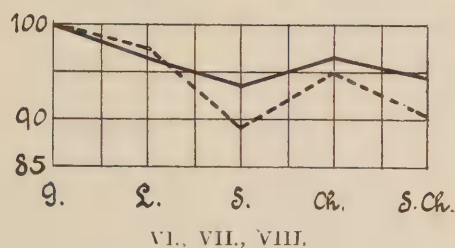
# The Effect of Scouring and Bleaching Upon the Structure and Strength of Cotton Fabrics

Delivered Before the Manchester Section of the Society of Dyers and Colourists, and Printed in the Journal of the Society

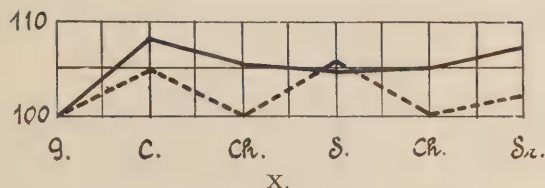
By J. HUEBNER, M.Sc.Tech., F.I.C.

(Concluded from page 200.)

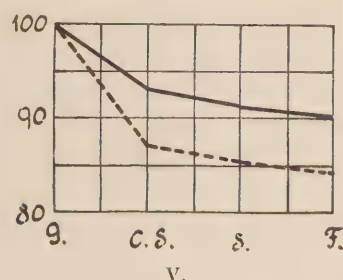
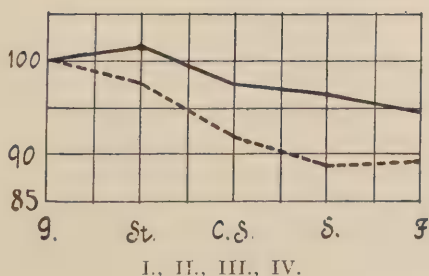
THE number of warp threads per inch in VI, VII and VIII increases in the lime boil, but remains stationary throughout the following processes, while that of the weft threads remains practically stationary throughout



The caustic soda boil shows greater irregularities than the other boils, and the end result differs in that the number of weft threads per inch is actually 2 per cent higher than that in the gray fabric. This is no doubt due to greater shrinkage in the warp.

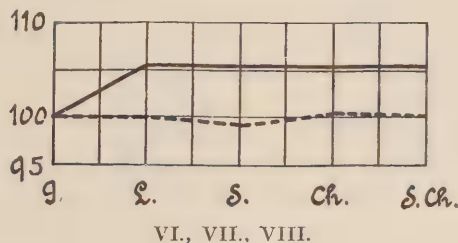


Boiling with caustic soda and soda ash is mainly responsible for the reduction in the tensile strain of fabrics I to V, both warp and weft way. The "steep"—i. e., a gentle boil with soda ash—actually slightly increases the strength of warp and weft in I and II, and that of the warp in IV.



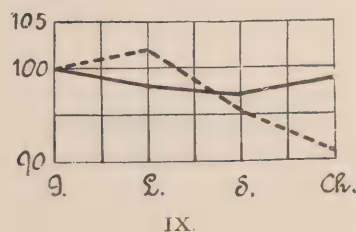
The effect of the lime boil on the tensile strain of VI, VII and VIII is very slight, while that of the soda boil which follows is much more marked, particularly in the weft.

Chemicking increases the tensile strain appreciably and the strength after the final soda boil, chemic and sour is slightly higher than after the first soda boil.



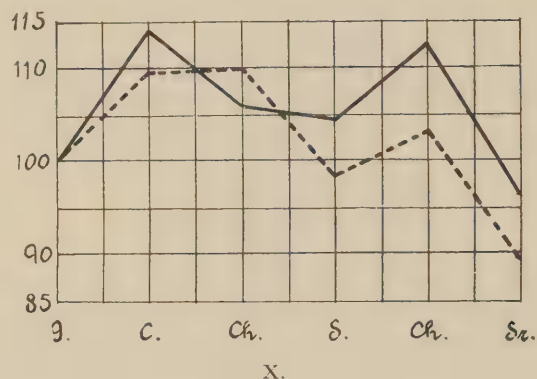
A comparison of the mean textile strain graphs of VI, VII and VIII with the mean of I, II, III and IV shows that boiling with lime and with soda ash is entirely responsible for the reduction in the tensile strain of these fabrics, and that practically no loss in strength results from the two bleaching operations and the souring.

The effect of the shorter process of bleaching (IX), in which the fabric is boiled in lime and only once in soda ash and once chemicked, on the tensile strain of the weft, is similar to that of VI, VII and VIII, but the strength of the warp is even less affected.

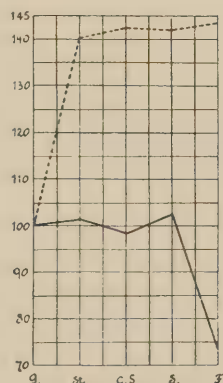




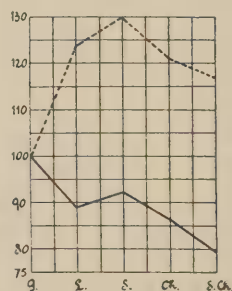
The effect of the caustic soda boil (X) is very marked. It increases the tensile strain in both directions (9.5—13.8 per cent). The first chemicking hardly affects the weft, but it reduces the strength of the warp, and a further reduction is noticed, less in the warp than in the weft, after the soda boil. The second chemicking increases the strength of both warp and weft appreciably, but the actual loss in strength takes place in the last operation of souring and drying. The final result, however, is as satisfactory as that obtained by the other methods of bleaching.



The increase in the elongation of the weft of a fabric at the point of breaking, when a tensile strain is applied, is very marked in all the different processes which have been investigated. It is greatest after the steep in I to IV, after the combined caustic and soda ash boil in V, after the lime boil in VI, VII, VIII and IX, and after the caustic soda boil in X. It then increases slightly but fairly regularly in I to V, during the following operations. In VI, VII and VIII it reaches its highest point after the first soda boil, and it decreases in the final operations.

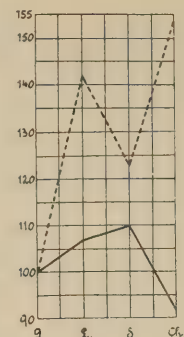


I., II., III., IV.



VI., VII., VIII.

The short bleach (IX) behaves differently from the former, in that the soda boil produces a reduction in the elongation, while the chemicking is responsible for a marked increase.

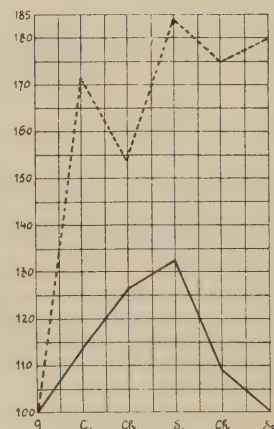


IX.

The caustic boil (X) behaves similar to VI, VII and VIII. The elongation decreases after the chemick and it increases after the soda ash boil. The second chemicking, however, produces a slight reduction which is largely counteracted by the final souring.

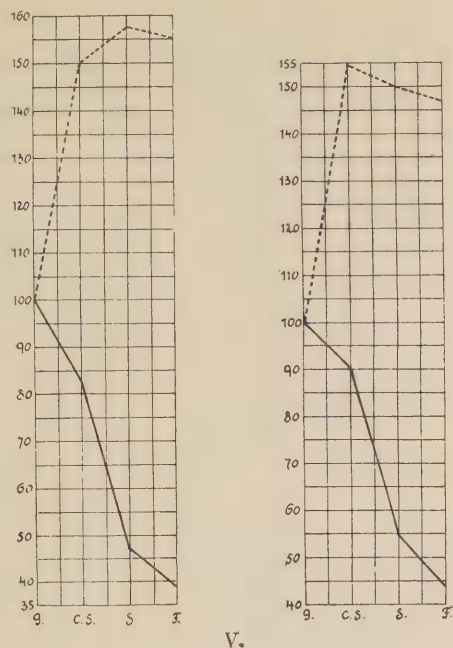
With the exception of the caustic soda boil (X), the elongation of the warp decreases in every case. It is most marked in V, where the loss amounts to 61.3 per cent.

In X an increase in the elongation actually takes place in the warp during the caustic boil, the first chemicking and the soda boil, after which the elongation decreases to that of the original gray fabric. It is obvious that one must expect irregularities in the elongation figures, because they are chiefly dependent upon two factors—i. e., the shrinkage produced by the action of the chemical agents employed and the varying amount of tension placed on the fabrics, particularly in the warp way, in the different machines.



X.

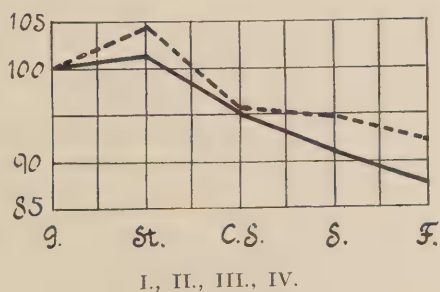
With the exception of No. V, it has not been possible to ascertain the regain after each operation. A comparison of this with the tensile strain elongation of the same fabric shows a remarkable similarity of the two characteristics, in that the elongations at the point of breaking are practically identical with the corresponding regains.



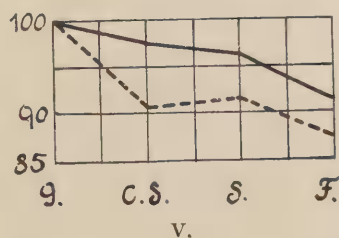
V.

It has, therefore, been shown that careful scouring with lime, soda ash or caustic soda and bleaching, does not unduly reduce the tensile strain of fabrics.

The effect of these processes upon the ripping strain of the bleached fabric is, however, distinctly different. In I to IV, the ripping strain in both warp and weft is slightly increased by the steep. The combined caustic soda and ash boil is chiefly responsible for the decrease in strength, which is greater in the weft than in the warp. In the second soda ash boil and in the final treatment, the strength of the warp decreases fairly uniformly, while that of the weft is only slightly affected by the ash boil, and is a little further reduced in the final treatment. V behaves very similarly to I to IV.



I., II., III., IV.



V.

A comparison of the tensile strain of these fabrics with their ripping strain shows a marked similarity as re-

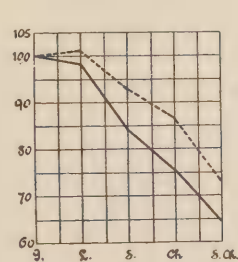
gards the effect of a thorough scouring on their resistance to either tensile or ripping strain.

The mean reduction in the ripping strain, warp and weft way, is only slightly less than that in the tensile strain and the ripping strain of the warp is somewhat less than that of the weft, while the opposite in the case in the tensile strain. The reduction in the tensile and the ripping strain of these fabrics which results from a thorough scouring is, therefore, not a serious one.

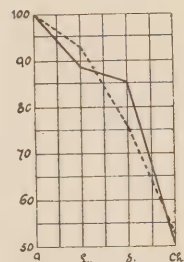
The effect of the lime boil in VI, VII, and VIII on the ripping strain is negligible, but it is somewhat more pronounced in IX. The soda boil, which follows, is responsible for a greater reduction in strength.

The ripping strain then becomes fairly uniformly lower in the chemic and in the second ash boil and chemic.

It should be noted that the reduction in strength resulting from the chemic is more pronounced in IX than in VI, VII and VIII, which have been twice chemicked and twice boiled with soda ash. This is most likely due to the fact that in order to obtain a satisfactory result on a less thoroughly boiled (bottomed) fabric, such as IX, the chemicking will have to be somewhat forced.



VI., VII., VIII.



IX.

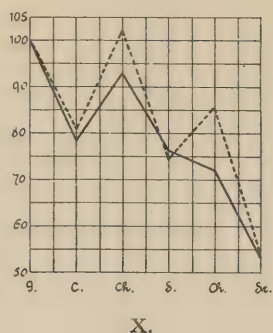
The ripping strains resulting from the different processes in the caustic soda boil differ distinctly as compared with those of the scouring and bleaching processes dealt with above.

The caustic soda boil weakens the warp nearly 22 per cent and the weft nearly 19 per cent.

The chemicking, however, reduces the loss in the former to about 7 per cent, and it eliminates the loss in the latter entirely. The soda ash boil is responsible for a further striking reduction, both in warp and weft, below that recorded for the caustic soda boil. The second chemicking reduces the strength of the warp slightly, but it increases that of the weft by over 10 per cent. The strength of both warp and weft is finally considerably reduced by the last sour and the drying.

A comparison of the lime boil (VI, VII and VIII) with the caustic soda boil (IX) shows that the ripping strain of the latter is distinctly below that of the former. It is practically the same as that of the short boil (IX).

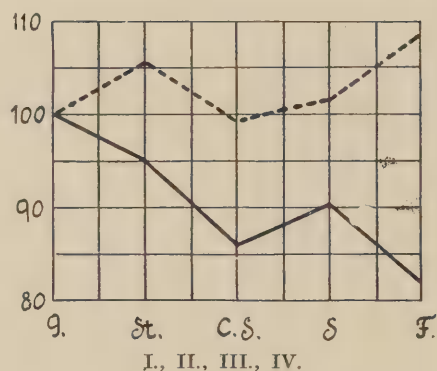




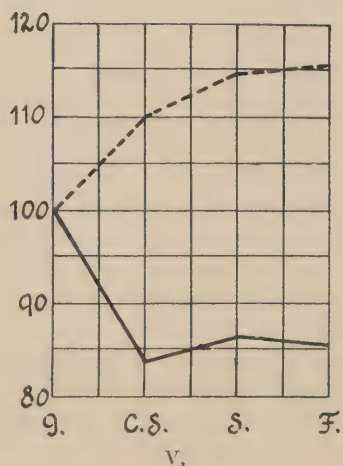
Considerable importance has hitherto been attached to results obtained by removing the warp and weft threads of a fabric and by ascertaining their tensile strain in order to determine the effect of chemical agents and mechanical processes upon the strength of the fabric.

As will be seen from the graphs given below, the results obtained by testing single threads are, however, not directly comparable with either the tensile or the ripping tests.

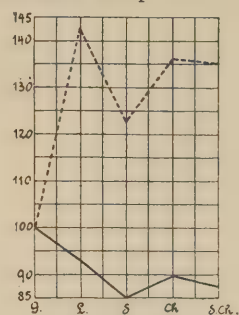
In the scoured fabrics I to V, and in the bleached fabrics, VI, VII, VIII and IX, the warp threads have been weakened, while the strength of the weft threads has considerably increased.



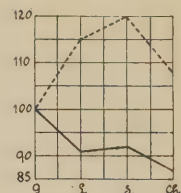
The decrease in the warp is about the same in all these fabrics, while the increase in the weft is remarkably high in the lime boiled, twice chemicked fabrics (VI, VII and VIII).



The results of the caustic boil are again distinct from those of the other processes. The increase in the strength of the weft is even higher than in VI, VII and VIII, and the bleached warp is actually stronger than the gray.

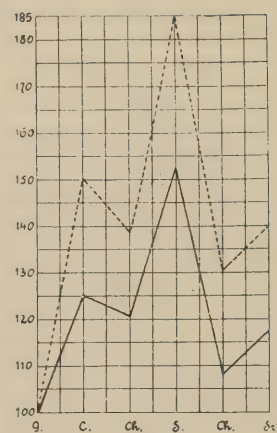


VI., VII., VIII.



IX.

The similarity in the behavior of the warp and the weft, and the increase in strength both after the lime boil and the soda boil and the corresponding reduction after the second chemicking is remarkable.



X.

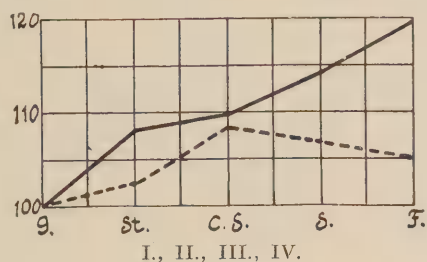
Attention should be drawn to a statement made by Mr. Lowe in a paper which he read before this Society a few months ago, that a yarn becomes more uniform when mercerized without tension. A similar effect has been frequently observed in single thread testing, namely, that steeping and boiling as a rule tends to make a yarn more regular, because many of the weakest places found in the gray yarn disappear, and the lowest mean result obtained in testing the steeped or boiled yarn is, therefore, higher than that of the gray. This may be offered as an explanation of the remarkable differences in the results of the single thread tests as compared with the tensile and the ripping tests.

The elongation of single threads at the point of breaking has also been noted, but it has been found that the figures obtained are not consistent. This is without doubt mainly due to the regain in the threads after removal from a fabric, which makes it exceedingly difficult to get uniform initial tension on the threads between the clips of the testing apparatus.

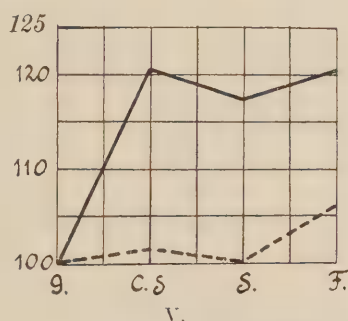
Definite information with regard to the action of boiling and bleaching agents on fabrics may also be obtained

by ascertaining the changes which occur in the counts, i. e., the weight of the warp and weft yarns. In the warp this is to a large extent due to the removal of the size.

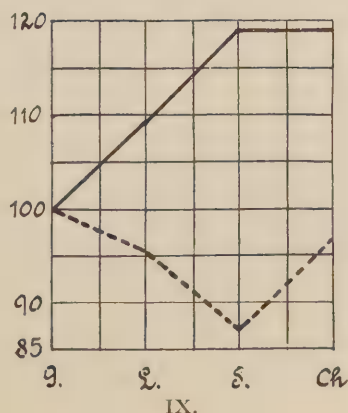
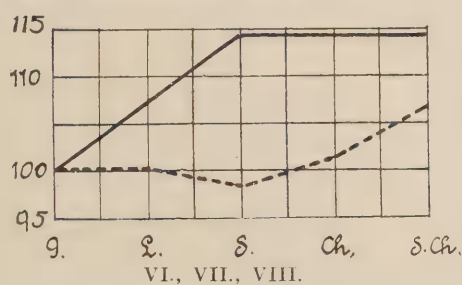
In scouring I to IV, the warp becomes gradually finer (100 to 120). It will be seen that the steep is responsible for the removal of a considerable amount of impurities and, therefore, a corresponding increase in the count of the warp, while its effect on the weft is naturally much less pronounced. The combined caustic and ash boil, however, is chiefly responsible for the increase in the count of the weft.



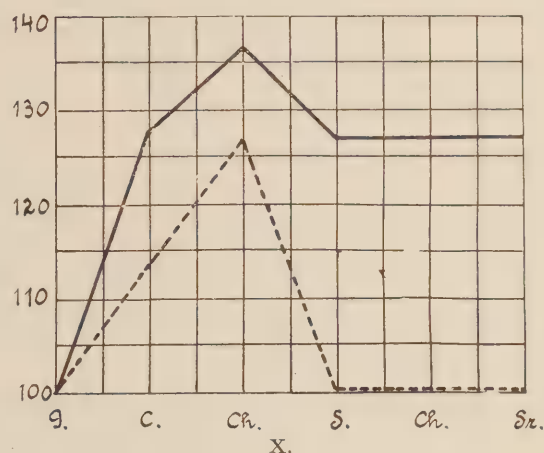
The effect on the warp of the lime boil, followed by the ash boil (VI, VII and VIII), and of the short bleach (IX), is very similar to that of the scour. The count of the weft in VI, VII and VIII, however, becomes finer in



the final ash boil and chemicking, while that in IX becomes actually slightly lower than the gray.



The nature of the change in the counts in the caustic boil is distinctly different when compared with the other methods of boiling. The counts of both warp and weft become much finer in the caustic soda boil than in either the combined caustic and ash boil or in the lime boil and they become still finer in the following chemicking. The next ash boil, however, makes the warp heavier and the weft practically returns to its gray weight. The latter change can only be accounted for by excessive shrinkage. After this no further changes take place in either warp or weft.



In considering the reduction in the tensile and the ripping strain of a fabric, in scouring and bleaching the change in counts should, therefore, be taken into consideration, because this reduction is partly accounted for by the fact that the counts of the warp become considerably higher in every case.

A comparison of all the methods of boiling and bleaching which have been investigated, shows that the tensile strain and the ripping strain are not directly comparable. The results of both tests, however, provide useful information, and while it might be premature to suggest that the ripping test should replace the tensile test entirely, it must be admitted that the tensile test alone does not give a complete record of the nature of the changes which occur in a fabric during scouring and bleaching.

The testing of fabrics for strength, although of considerable interest to the user, is of far greater importance to the spinner, the manufacturer, the bleacher, the dyer, the calico printer and the finisher.

Only by testing fabrics before and after each of the different operations in a very thorough manner can we expect to obtain information which may ultimately lead to improvements in the structure of yarns and fabrics, as well as in the mechanical and chemical processes through which they have to pass.

In submitting this communication it should be pointed out that, so far, only plain fabrics have been dealt with, and that it will be necessary to extend the investigation to fabrics of a more complex structure. When we further take into consideration the great variety of processes through which the fabrics have to pass in bleaching, dye-



ing, printing and finishing, it will be admitted that the scope of such an investigation is, practically speaking, unlimited.

Throughout the present investigation one has seen that the results obtained in scouring and bleaching are considerably influenced by the structure of the yarn and of the fabric, and that uniformly satisfactory results can only be expected by close co-operation between the spinner, the manufacturer and the bleacher.

The value of industrial research, as suggested above, seems to have been fully realized in America. In recommending it for the serious consideration of the industries concerned, I herewith give an abstract of an article headed "Converters and Finishers Stress Research Body Need," which appeared in Fairchild's Bulletin of November 26, which may not be out of place.

"The Converters' Association and the National Association of Finishers of Cotton Fabrics are working together for a cause which they consider to be the most important confronting the industry to-day. Through the proposed Research Bureau, which has been mentioned in these columns repeatedly, it is insisted that the general production of the cotton mills would be improved, similar cloths standardized, and waste in the way of 'seconds' reduced to an absolute minimum.

"As an instance, it is pointed out that, in a 38½ inch, 64 by 60, print cloth to-day, the weights range from 5.20 yard to 5.50 yard. One mill may use a 28s warp, another 29s, or a 30s warp, and each produces a cloth which it considers standard. The contention is that, in the printing or dyeing of these goods, it is possible that the difference in the weights of the various cloths may affect the impression on the finished product to more than a little extent. The converters and finishers insist that, through study, there would be developed what number yarn was the best to be used; and could thereby introduce a definite standard for all mills to adopt."

The author desires to acknowledge the services rendered by his assistants, Messrs. F. W. Altham and J. E. Hardman, in connection with the large amount of experimental work involved.

*College of Technology,  
Victoria University,  
Manchester.*

### GUESSWORK IN THE DYEHOUSE

The temperature of solutions used in dyeing is a very important matter. Often the difference between a successful batch and one which has gone wrong may be traced to the influence exerted by a few degrees of heat. Few dyers realize the importance of knowing exactly the temperature of the dye bath. For instance, how many dyers think of using a thermometer to determine whether the water in a dye kettle is boiling? Some do, but the vast majority guess at it. Most of us associate a bubbling with boiling—really a very natural thing to do, since most liquids at their boiling point show considerable ebullition.

Recently a test was made to decide if it was possible for one to judge correctly whether water was boiling or

not without the use of a thermometer. A Hussong kettle was used, having a capacity of nearly one thousand imperial gallons of water. Five experienced dyers were independently tested; only one dyer was in the dyehouse at any time, and he was not acquainted with the decisions made by the others. Two tests were made, one with the propellers in action and one with them still. Actual temperatures were read from a standard angle thermometer inserted in the kettle. The temperature of the water was about 120 deg. Fahr. when the steam was turned on. The dyer was asked to state when he thought the water in the kettle was boiling, and as soon as he had made a decision the thermometer reading was recorded.

The results obtained were surprising, and of the ten guesses made only one came within three degrees of the truth. As might be expected, the decisions made when the propellers were in motion were furthest from the thermometer readings. The lowest guess was 188 deg. Fahr.—that is, the dyer stated that in his opinion the water in the kettle was boiling when reference to the thermometer showed the temperature of the water was 188 deg. Fahr. The nearest guess was 201 deg. Fahr., which is, of course, 11 deg. out. When the propellers were motionless, the decisions were nearer to the truth; the lowest was 196 deg. and the highest was 209 deg. Fahr.

Another interesting set of experiments was conducted in a raw-wool scouring plant, using several four-bowl machines. Each machine was run continuously for ten hours per day, and the temperature of the water in each bowl was regulated according to the judgment of the operator. No thermometers had ever been used. Since the temperature of the scouring solutions is very important in the first two bowls, attention was given to these. Distant recording thermometers were installed during a week-end in such a manner that the operator was not aware of their presence. Readings were made every hour while the machine was in operation. The correctness of the operator's judgment was studied in the light of these readings.

The variations in the temperature of the scouring solutions were considerable, and frequently dangerous. This is not surprising, since the only guide that the man had was to place his hand in the water for a brief period and rely on his experience to help him out. Naturally, under these conditions, a uniformly scoured product was seldom obtained, and some batches were yellow and harsh, due to scouring the wool at a temperature higher than is desirable. Later, thermometers were installed on the machines and the men taught to regulate the temperature in terms of degrees Fahrenheit.

What can be learned from these experiments? They emphasize what should be a well-known fact—viz., that you cannot guess at temperatures and be correct. Once in a hundred times you may guess so near to the truth that the difference is negligible, but in the other ninety-nine trials you will be wrong, and a mistake may be made which may prove to be very costly. If one can seldom guess when the water is actually boiling in a

*(Concluded on page 236)*

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

### *President*

LOUIS A. OLNEY  
Lowell Textile School, Lowell, Mass.

### *Vice-Presidents*

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5 Mountain Avenue, Maplewood, N. J.

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ELMER C. BERTOLET      GEORGE A. MORAN  
ARTHUR E. HIRST      WILLIAM K. ROBBINS  
WALTER M. SCOTT

## FIFTH COUNCIL MEETING

The fifth meeting of the Council of the American Association of Textile Chemists and Colorists was held at the Engineer's Club, Boston, Mass., on Friday March 10, 1922.

The following members were in attendance: L. A. Olney, Wm. D. Livermore, Wm. H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee and W. E. Hadley.

Wm. K. Robbins was unable to attend, but was represented by Miles R. Moffatt of the Amoskeag Manufacturing Company.

The following members were admitted into the Association by vote of the Council:

### *Active Membership*

Anders, H. R., P. O. Box No. 3, North Dighton, Mass.  
Chemist, Mt. Hope Finishing Company.  
Betz, L. D., Swanson and McKean Streets, Philadelphia, Pa.  
Manager, E. F. Drew & Co.  
Dabbs, John L., Box 1251, Charlotte, N. C.  
Sales Manager, Du Pont Company.  
Ferguson, P. A., 26 Rosewood Street, Pawtucket, R. I.  
Colorist, Acme Finishing Company.  
Flynn, Oscar R., 673 Springdale Avenue, East Orange, N. J.  
Chemist, Waldrich Bleachery.

Herrmann, Henry F., 21 Burling Slip, New York City.  
Chemist, National Aniline & Chemical Company.  
Jones, A. S., 1400 East Tenth Street, Eddystone, Pa.  
Assistant Colorist, Eddystone Print Works.  
Millea, M. J., 706 North Fifty-eighth Avenue West, West Duluth, Minn.  
Dyer, Klearflax Linen Rug Company.  
Musgrave, A. F., 365 St. John's Place, Brooklyn, N. Y.  
Textile Chemist, American Aniline Products.  
Pratt, L. A., Merrimac Chemical Company, Woburn, Mass.  
Director of Research.  
Pressell, G. W., 240 West Somerset Street, Philadelphia, Pa.  
Chief Chemist, E. F. Houghton Company.  
Pullar, C. A., 800 Argyle Road, Brooklyn, N. Y.  
Salesman and Demonstrator, Ciba Company.  
Remlein, F. L., 2007 Daly Avenue, Bronx, N. Y.  
Colorist, Du Pont Company.  
Roberts, H. D., Magog, Quebec.  
Supt., Dominion Tex. Co. Print Works.  
Roegner, E. W., Box 198, Rockaway, N. J.  
Colorist, Weiss, Wilhelm, Inc.  
Romero, J. G., Dighton, Mass.  
Consulting Chemist, Arnold, Hoffman & Co.  
Schroeder, H., Sayles Finishing Plants, Saylesville, R. I.  
Textile Chemist.  
Schuler, George H., 41 Zeigler Tract, Penn's Grove, N. J.  
Colorist, Du Pont Company.  
Shea, Jr., D. J., 1215 Filbert Street, Philadelphia, Pa.  
Chemist, S. McDowell Company.  
Tice, M. E., 47 Zeigler Tract, Penn's Grove, N. J.  
Demonstrator, Du Pont Company.  
Wilkinson, E. A., Lonsdale, R. I.  
Dyer, Lincoln Bleachery & Dye Works.  
Wilmot, H. F., 85 Fort Green Place, Brooklyn, N. Y.  
President, Tinctura Laboratories.

### *Junior Membership*

Chapin, Dr. H. C., 290 Pine Street, Lowell, Mass.  
Assistant Professor, Lowell Textile School.  
Deane, R. J., 94 Campbell Street, New Bedford, Mass.  
Chemist, American Printing Company, Fall River, Mass.  
Morrison, A. W., 346 North Main Street, Andover, Mass.  
Assistant Chemist, Washington Mills, Lawrence, Mass.  
Nure, A. D., 914 Highland Avenue, Fall River, Mass.  
Chemist, American Printing Company.



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It was voted to set aside a page in the Secretary's Records in Commemoration of our late Councillor, James L. Amsden.

The matter of Corporation Membership was discussed but it was decided that nothing definite could be done by the Council, and the matter was deferred until the next Annual Meeting.

The Council voted that the Secretary should immediately send to the members a list of new applicants for membership.

Respectfully submitted,  
W. E. HADLEY, Secretary.

#### FOURTH RESEARCH COMMITTEE MEETING

The Fourth Meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held in the Engineers Club, Boston, Mass., on Friday, March 10, 1922.

The following members were in attendance: L. A. Olney, Wm. D. Livermore, Wm. H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee, M. R. Moffatt (representing Wm. K. Robbins), Wm. R. Moorhouse, W. J. Murray and R. E. Rose.

George A. Moran was elected Chairman of the Special Committee investigating the Fastness to Washing of Cotton Materials.

The following Subcommittee heads reported progress in the outlining of work which it is proposed to do in establishing standards of fastness, as follows:

George A. Moran, for Cotton.  
Wm. D. Livermore, for Wool.  
W. M. Scott, for Silk.

The series of washing tests for dyed silk, presented by Dr. Scott, Chairman of the Subcommittee on Silk, was adopted provisionally by the Research Committee and is as follows:

PROVISIONAL METHOD  
*Washing Test for Dyed Silk*

Proposed by the Research Committee of the American Association of Textile Chemists and Colorists.

DIRECTIONS FOR TESTING  
*On Skeins*

Take about a five-inch length of the dyed silk skein, divide it in three parts, and add to each part an equal amount of undyed silk, wool and cotton, respectively, then weave into a braid. Heat the soap solution to the designated temperature, then immerse the braid for two minutes. Remove the braid from the solution, pass it

through a wringer, and then return to the soap solution again. Repeat this process until there have been five immersions in the soap of two minutes each, followed by a passage through the wringer. At the end, rinse the braid in cold water, extract and dry. Note staining of wool, cotton or white silk, also loss in shade of the dyed silk.

#### *On Pieces*

For this test use a piece about four inches square and duplicate the procedure described above. If the piece is a plain color, note simply change in shade. If there are colored stripes or any other pattern, note change in shade and also staining of the adjacent fabric.

#### SPECIFICATIONS FOR SOLUTION AND TEMPERATURE

- Test No. 1—Soap Solution (1%) at boil
- Test No. 2—Soap Solution (1%) at 160° Fahr.
- Test No. 3—Soap Solution (1%) at 120° Fahr.
- Test No. 4—Soap Solution (1%) at 85° Fahr.
- Test No. 5—Equal volumes of soap solution (1%) and salt solution (1%) at 85° Fahr.

The soap used is the best grade of neutral tallow chip, such as Lux or Ivory Flakes.

Later on specific type dyes will be designated by the Committee as satisfactorily withstanding the five tests described above.

The Research Committee asks for criticism, suggestions and a full discussion of this, and all other, provisional methods that may be published.

It is only through such criticisms and suggestions on the part of individual members of the Association and others who may be interested that the official methods finally adopted may be acceptable to all who may be able to make use of them.

Provisional methods for washing of cotton and wool will be published later.

Respectfully submitted,  
W. E. HADLEY, Secretary.

#### NOTICE OF MEETINGS

The next meeting of the Council will be held Friday, April 14, 1922, at the Engineers Club, Boston, Mass., at 4 P. M.

A meeting of the Research Committee will be held at the same place at 4.30 P. M. of the same day.

Members wishing to bring any matters to the attention of these meetings will please communicate with either the President or the Secretary.

The Executive Committee of the Northern New England Section is planning a meeting to be held about the

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middle of April, to take the form of an "experience meeting" for discussion of the general subject, "Shady Goods." The date and place will be announced later.

### CHANGES OF ADDRESS

The following changes and corrections in names and addresses of members should be noted:

- K. A. BROWNELL  
Standard Bleachery  
Carleton Hill, N. J.
- S. F. CARTER  
77 Lafayette Avenue  
Passaic, N. J.
- EDWARD M. GLENNON  
10 Arlington Street  
Lawrence, Mass.
- THOMAS E. KIDD  
P. O. Box 47  
Wilton, Me.
- MORTON H. WERTHEIM  
Kraemer Hosiery Company  
Nazareth, Pa.
- H. S. MORROW  
16 Elton Street  
Providence, R. I.
- FRANK J. OESTERLE  
Van Raalte Company  
Paterson, N. J.
- PHILIP C. PUTNAM  
Apponaug Finishing Company  
Apponaug, R. I.
- W. H. WINGATE  
2432 Pawtucket Avenue  
East Providence, R. I.

### ADDITIONAL CHARTER MEMBERS

Through an oversight, the names of the following Charter Members were omitted from the original list published in the December 5, 1921, issue of *THE AMERICAN DYESTUFF REPORTER* and are herein given, together with their addresses and business affiliation:

- Delys, Reni J. B., 52 Upland Road, Woonsocket, R. I.  
Rosemont Dyeing Company.
- Ferguson, Duncan, Box 107, Webster, Mass.  
Dyer, S. Slater & Sons Company.
- Wade, Joseph L., 6632 Elmwood Avenue, Philadelphia, Pa.  
Chemist, Aberfoyle Manufacturing Company.

### NOTICE FROM THE SECRETARY

#### APPLICATIONS FOR MEMBERSHIP IN THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

All individuals who believe that they are eligible for membership in the Association and are desirous of affiliating with the organization can communicate with the Secretary, who will gladly furnish application blanks and extend to them every possible assistance.

It is desirable that members of the Association should make an effort to interest all those whom they believe would make desirable members.

The Secretary will at all times be pleased to provide members with as many application blanks as may be desired.

W. E. HADLEY, Secretary,  
5 Mountain Avenue, Maplewood, N. J.

### THE DEVELOPMENT OF TESTS FOR THE FASTNESS OF DYESTUFFS

By WALLACE J. MURRAY  
*Contributions from the Laboratories of  
Arthur D. Little, Inc.*

From the earliest times the fastness of dyestuffs has been of importance. The ancients must have had tests for fastness, and used them in selecting the fast colors which we find in fabrics of ancient and even prehistoric origin. As new natural products were found which would color fabrics, experiments must have been made to determine their value in actual use. In medieval times the distinctions between fast and fugitive colors were well known.

Until the introduction of synthetic organic colors, the number of dyeing materials was limited and tests of actual use were probably sufficient.

"Ure's Dictionary of Arts, Manufactures and Mines" (sixth edition), published in 1867, gives a good idea of the tests used at that time. The following quotation is from page 131 of Volume II:

"In trying the stability of dyes, we may offer the following rules: That every stuff should be exposed to the light and air; if it be intended to be worn abroad, it should be exposed also to the wind and rain; that carpets, moreover, should be subjected to friction and pulling, to prove their tenacity; and that cloths to be washed should be exposed to the action of hot water and soap. However, such tests are not at all applicable to most of the colors dyed upon cotton stuff. Not many of them can stand the action of hot water and soap, or even such acids as the juice of fruits. Indigo blue, one of the most permanent dyes on cotton, yields its intensity to every operation of washing, even in pure water."



Ure differentiates between permanent and fast colors. He shows that the rate of fading of a color depends upon the nature of the fiber and the humidity of the air.

From this time on the development of dyeing was rapid, and the development of dye testing kept pace with it. For a complete survey of this development one should refer to the papers listed in "A Bibliography of Literature on the Fastness of Dyes." (This journal, February 13, 1922.)

This paper will summarize a few of the more important of these papers, which fall into three distinct groups. The first describe tests performed for the purpose of classifying dyes according to their fastness. Since these do not concern the tests themselves but rather the dyestuffs, they fall outside the scope of this paper. The second describe work done on developing particular tests. The third describe complete series. These last two groups will be considered together, and summarized in the table at the end of this paper.

#### FASTNESS TO LIGHT

In the earliest tests the material was simply exposed to the sun for known lengths of time. It was apparent at an early date that this method was unsatisfactory, since the fading power of the sun was very variable. However, many light fastness tests are still reported in hours or days exposure to bright sunlight without any attempt at measuring intensity of the light. There are three possible methods of overcoming this difficulty, namely: (1) Measuring the intensity of the sunlight; (2) substitution of some constant light for sunlight; (3) substitution of a chemical reaction for actual light tests.

#### METHODS OF MEASURING LIGHT INTENSITY

In 1898 J. Hertzfield recommended the simultaneous exposure of the dyed material and cotton dyed with Turkey red or medium indigo. The rate of fading of these known dyes gave a measure of light intensity.

P. Dosne and others in a series of papers from 1900 to 1910 described a method based on exposing the dyed fabric and an actinometer to the sun. His actinometer consisted of two bulbs, one blackened and protected with a vacuum jacket and the other clear. A volatile liquid was placed in the black bulb and the amount distilling over to the clear one measured the intensity of the light.

Lange in 1903 used a series of fast dyes of various colors, such as Indigo, Alizarine, Tartrazin, etc., as standards. The sample was compared with a standard

of similar color. The rate of fading measured the light. These standards were dyed in various tones to get variable degrees of fastness, since pale tones are always much more fugitive than heavy ones.

Krais in 1911 brought out his bleach-hour method. He prepared sensitive papers by coating unsized paper with clay dyed with Victoria Blue, using gum arabic as a binder. Standard papers were prepared by exposing these sensitive papers for one, two, three, four and five hours to constant, bright sunlight, representing one, two, three, four and five bleach hours. In making the test the sample was exposed to sunlight with a piece of sensitive paper. As fast as the paper faded it was removed and replaced by a fresh piece. All these papers were saved. When the sample first showed signs of fading, all the papers were compared with the standards to determine how many bleach hours each had been exposed. The bleach hours of all the papers were added together to determine the total bleach hours of the sample. This process has been criticised because of: (1) The fading power of light of different lengths is not the same on the blue standard as on other colors; (2) the large number of color comparisons leads to inaccuracies; (3) it is difficult to make the papers absolutely uniform.

In 1914 the German "Echtheitskommission" recommended that a series of standard dyes of graded fastness be exposed with the sample. One color is given for different fibers. In 1916 the revised table contained these tests unchanged.

#### ATTEMPTS TO USE ARTIFICIAL LIGHTS

A great deal of work has been done on this subject, particularly by various electrical manufacturing firms wishing to sell apparatus.

In 1911 A. Scheurer carried out a series of experiments comparing the mercury arc with sunlight. He showed the excessive effect of this light on benzo dyes, and its comparatively slight effect on Indigo.

In the same year Gebhard proposed a light containing both a carbon and a mercury arc.

In 1915 Mott presented a paper to the American Electrochemical Society on the flaming arc in dye testing. This article gives a good bibliography of the subject. According to him, the high amperage arc reproduced sunlight conditions except in speed, the arc being much more rapid.

In 1921 Gordon compared sunlight in Arizona and New Jersey, the violet carbon arc, R. U. V. and Hanovia Quartz mercury arcs. He finds the carbon arc very similar to sunlight.

*(To be concluded.)*

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the  
mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

*Advisory Editor*

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## A DISTINCTION

OF all the arguments and testimony introduced during the Senate "dye monopoly" investigation, which will be further discussed in future issues, none which had been offered up to the moment of writing had eclipsed in importance, to the general public, a certain distinction pointed out by Irene du Pont, President of E. I. du Pont de Nemours & Co.

Besides proving the now defunct Du Pont-Levinstein agreement to have been pronounced entirely legal by Senator Wolcott, declaring the records of his company to be "wide open" to the investigators, and shedding some exceedingly interesting light on the competition which exists within the ranks of the American dye industry to-day, Mr. du Pont stated, apropos of the "lobbying" charges of Senator King:

"We [the Du Ponts] have been here frankly and openly. We want the best protection we can get against the German Cartel. We have signed our statements and have nothing to take back. If that is a lobby, then we confess we are one."

Mr. du Pont declared that his concept of a lobby was the organized circulation of "lies and misleading propaganda" by those who do not dare let it be known that they are connected with the work.

"I can make no charges," he added, "but such propaganda has been circulated, and I naturally suspect that it is the work of the real trust, the German Cartel; for that trust does not want the American industry to thrive."

This is the answer to the whole series of absurd charges concerning "propaganda." It is a distinction which has always been present, has been vaguely realized by many, even among the public—and expressed by few.

The public has repeatedly been told by one faction that the German dye makers were circulating propaganda to help maintain their supremacy, and it has

repeatedly been told by another faction that the American dye makers were circulating propaganda. Therefore, by implication, one was as bad as the other.

As a matter of fact, even straight advertising is one form of propaganda. Speeches made at public gatherings such as women's clubs, scientific associations, etc., are propaganda. But the Germans never worked that way—and indeed, must have regarded the efforts to tell the truth about the American dye industry and the real necessity for the preservation of our coal tar chemical industries in general, as highly amateurish in comparison with the finished methods employed by agents of the Cartel, who go at it by devious and round-about ways. As we have tried to point out before, propaganda of a sort is necessary in any kind of an undertaking dependent upon public support for its furtherance. But there are ways of enlisting this support which are regarded as legitimate by everyone, and ways which are regarded as illegitimate because they do not put the proposition squarely up to the final arbiters for an unbiased decision. One seeks to call attention to whatever claims to merit an institution or a movement or a business proposition may possess, leaving the public to judge whether it will accept or reject it. The other seeks by every means at hand to belittle, and discredit, thereby automatically creating favor for its own proposition by turning the judges against the other. One is open, says what it means, and offers the public a choice. The other is secret, circulates malicious falsehoods, and in a hole-and-corner fashion tries to indicate flaws, whether they exist or not. One tries to build up, the other to pull down.

Mr. du Pont is to be thanked for so effectually showing the Senate Committee the essential difference between the American and German methods

## "THE WORLD DO MOVE"

ONE of the several forms of inertia with which those urging adequate protection for the American dye industry have had to contend, has been that type of intellect which seems wholly unable to distinguish between fundamental principles for the conduct of national life, and what may be called superficial, or political principles—principles of expediency. The latter should always be governed by the former; but may, without violating any of them, be to the former as the waves to the tides, or the top soil to the bedrock beneath. They must be ever changing to conform to new conditions, and it is unwise to allow them to become traditional.

To the first class belong such principles as honor, charity for the unfortunate and afflicted, liberty, democracy and others which are part and parcel of the American creed and which are just as binding upon us in our day and age as they were in George Washington's. To the second class belong such principles as determine whatever foreign policy may be best suited to the changing seasons of strife or peace, the tariff of the moment, etc. These have been altered, over-



turned, rearranged and restored repeatedly, and usually because of necessity. Yet there are some who persist in thinking each time that the latest should be the last.

These may find evidence to the contrary on every hand. They may discover, if they will but look abroad occasionally, that all the nations dance to the same tune of expediency—usually without violating their fundamental policies, good, bad or indifferent as the case may be. And as a recent example of this kind we refer them to certain portions of an article by Maximilian Toch, of New York, who is well known in chemical circles. Writing in the "Journal of Industrial and Engineering Chemistry" of a recently completed European tour, Mr. Toch says:

"England has always been a free trade country, but since the war she has seen her industries slipping, with every indication of going under, and has enacted a general tariff bill, called the 'Safeguarding of the Industries Act' in which a duty of 33 1/3 per cent has been placed on all industries which need protection, such as optical glass and optical instruments; scientific glassware; laboratory porcelain; synthetic colors, rare earths, and chemicals. In addition, an Anti-Dumping Act has been enacted, which became a law on October 1, 1921. I can quote only Part 2, Section B, of the Anti-Dumping Act of England, which relates to the depreciation in value of foreign currency, which we would do well to follow:

"Evidence as to price at which similar goods can be profitably manufactured in the United Kingdom.

"Evidence to show that the depreciation in relation to sterling of the currency of the country of manufacture is responsible for the fact that the prices at which the goods are sold or offered for sale in the United Kingdom are below the prices at which similar goods can be profitably manufactured in the United Kingdom."

"In addition to this, England has protected her dye and synthetic chemical industry by means of embargoes and prohibitions which prevent some foreign chemicals from coming into the country.

"The condition in France is still more interesting, for France has enacted a tariff, known as the Law of September, 1921, which is composed of four distinct types of tariff. They are known as the 'old tariff,' 'new tariff,' 'favored nation tariff,' and the 'coefficient.'

"The 'old tariff' is the one which existed prior to that date, and applies to some materials not made in France, and others not indigenous to France. The 'new tariff,' generally speaking, is a very high tariff on certain chemicals and manufactured articles. The 'favored nations tariff'—from which the United States is conspicuously absent—favors those countries which France has chosen; but the most important and interesting part is the 'coefficient.' This is a number, 2, 3, 4 or more in the fourth column of the Tariff, which in every instance is used as a multiple of the duty assessed. In other words, precipitated barium sulphate is assessed at 2 francs per 100 kilos, and includes the

coefficient 5; therefore, it is dutiable at 10 francs per 21 pounds.

So much for what other nations have seen fit to do in order to meet changing conditions following upon the war. Further along, the writer says:

"The condition in Germany is exceedingly interesting in view of the fact that by far the largest part of the plants in Germany are working nights. There is no unemployment, as there is no foreign competition. As I pointed out to the Treasury Department last summer (in June, 1921), Germany, in addition to her high tariffs, has a list of embargoes which precludes the importation of any material which can be made in Germany out of German raw material. If we wished to retaliate by shipping 1,000 tons of barium peroxide to Germany at five cents per ton it could not be done, because the material could not enter any of the customs ports of Germany.

"The man who goes to Berlin, lives at a fine hotel, and orders the best wine for a few cents a bottle in our money, and then comes back talking about how prosperous Germany is, is not acquainted with the facts. It is true that Germany is working very hard, and that one passes hundreds of factories brilliantly illuminated at night, particularly in the iron district near Essen, but the workman is being paid in currency that is continually depreciating, and the savings which he put aside last year, when the mark was worth 1.6 cents, have depreciated until now their purchasing power is far less than it was a year ago, and their international value has fallen to half a cent."

Many of our legislators in Washington have taken account of these conditions abroad, and are shaping their recommendations accordingly; others, however, do not, or will not, recognize the fact that "the world do move," and that while things will change from their present aspect into something else, just as certainly as they changed from their former aspect into the present one, nevertheless at present they are as they are, not as they were, and must be dealt with by present-day methods instead of traditional ones. What these present-day methods consist of, as applied to the case in point, may be seen by the conduct of France and England, who are a trifle closer to the music than we. In other words, there is no law against changing methods of doing business in any line just so long as the fundamental principles of honesty are not violated, and according to The REPORTER'S view, it is entirely honest and American to adopt whatever legitimate protective style happens to be in vogue. In this matter of protecting home industries, each country has reserved the right to be pretty much a law unto itself anyway, and since the penalty for overstepping the accepted bounds has always been the loss of foreign trade, there is little danger in allowing each one to shape its own commercial policies.

Further, he who believes America can maintain trade policies of twenty or even ten years ago, in the face of the present trend, must indeed have great faith in the existence of latter-day miracles.

By way of a conclusion to his very interesting observations on the status of our late military and present commercial antagonist, Mr. Toch offers the view that "as far as stocks of raw materials and finished products in Germany are concerned Germany will soon come to the end of her tether in the matter of textiles, for, with their depreciating mark, they are unable to buy cotton, wool, and silk at competitive prices. As far as chemicals are concerned, Germany has enough raw material to undersell the world for many years."

Which fact will repay further study and action looking to a possible emulation, with such modifications as may seem expedient, of course, of the policies of our friends in Western Europe, who apparently have been living in this world long enough to realize that it is perpetually on the move.

### THE 1923 SILK EXPOSITION

**A**LTHOUGH it will not take place until nearly a year from now, plans are already well under way for the Second International Silk Exposition, to be held under the auspices of the Silk Association, February 5 to 15, 1923, at the Grand Central Palace, New York. And although the prime object of the affair, as heretofore, will be first, last and always the promotion of the silk industry, we again take occasion to remind the dye manufacturers of America that their best efforts to aid and co-operate with the various committees in charge of this truly lovely spectacle, will not be wasted.

It is altogether likely, however, that the dye people do not need this reminder, which is more in the nature of "a word to the wise" than an attempt to impart information. For they comprehend full well that of all the various trade showings of one kind or another, not excepting the Chemical Show, the Textile Show and the numerous fashion shows which are always taking place, none provides a better opportunity for an effective and lasting demonstration of their resources.

This is true for a number of reasons. In the first place, the Silk Show enjoys an attendance by the general public which compares favorably with any. Then, its appeal to the senses of those who delight to revel in the sheer beauty, for its own sake, of color harmonies ranging from the gorgeous to the subdued, is both powerful and permanent. Again, the finest achievements and capabilities of our dye makers can probably be expressed to the best advantage through the medium of silken fabrics. Again, the elaborateness with which the Silk Show is staged by its promulgators, who will spare no pains or expense in order to make it truly representative of this great industry, gives assurance that all possibilities in the way of delicate tints and shades (we employ, for the nonce, the language of ordinary conversation and not the strictly scientific terminology advocated by Mr. Low) will be exhausted for the display. And finally, the event will again be exploited from one end of the coun-

try to the other by means of "Silk Week," during which department stores will devote special windows to showings of the latest creations in silk.

As has been pointed out in these and other columns before, the main factor on which the Silk Show relies to obtain its irresistible appeal to both feminine and masculine representatives of the general public, is color. This is by no means a disparagement of the wonders wrought in various weaves and designs in costume; but the fact remains that without the infinite variety of color combinations at the disposal of the designers, their work would become well-nigh meaningless when judged by the standards of to-day, and that the first impression received by the visitor to the Silk Show, as well as the last one carried away, is the almost bewildering array of color. It is desirable that readers again be reminded of the fact that the silk industry, as at present constituted, is the dye industry's fairest daughter, and that this self-same public which storms the doors, blocks the aisles and stands on tip-toe to view the interior of booths displaying colored silk fabrics, be so reminded when the proper time arrives.

### IMPROVED PROSPERITY THROUGH IMPROVED COMMERCIAL STANDARDS

**A** POWERFUL and vigorous organized effort is gaining momentum in business to-day to eradicate the barnacles and impediments of business practice, particularly the obstacle of bribery and secret commissions.

Fair and honest dealing in business is the foundation of confidence. "It pays to be honest—in the cash drawer it pays best." Without it quality goods, advertising, salesmanship, do not make sales. It is the very cornerstone of our whole economic civilization.

Yet evil persists, and calls for courage on the part of business men to "clean house" and, in fact, to work for the enactment of better laws on the subject. While it is true that commercial bribery is more rampant in some industries than in others, the hard fact is that it has a tendency to spread if not suppressed; and both buyers and sellers generally are affected, to say nothing of the consumer whose costs are inevitably increased by the baneful evil.

American business faces a hard task at home and abroad to increase prosperity and trade, and logic and common sense as well as the moral ideal of American business, call for extermination of the barnacles of dishonesty and malpractice. In years past, American business was splendidly advanced by the establishment, through the efforts of a great dry goods merchant, of the fixed price in place of haggling barter; and later by the abolition of secret rebates, etc. The next great moral step should be the abolition of commercial bribery by a Federal statute which has already been framed and recommended for passage in Congress by the Committee of the Judiciary.

An organization which has adopted the name of the



Commercial Standards Council has recently been formed. Its membership comprises earnest, thinking men, who themselves are for the most part executive officers in a large number of business associations of national importance, such as the Synthetic Organic Chemical Manufacturers Association of the United States, the National Association of Purchasing Agents, the Association of National Advertisers, the National Association of Credit Men, the Associated Advertising Clubs of the World, the New York Sales Managers Club, the Philadelphia Sales Managers Association, the American Association of Pyroxylin Manufacturers, the American Ship Service Corporation, the American Society of Sales Executives, the National Wholesale Grocers Association, the National Association of Printing Ink Makers, the National Association of Office Appliance Manufacturers, the Insecticide and Disinfectant Manufacturers Association and many others.

The general object of the Commercial Standards Council is to foster and maintain higher standards in business. It has, however, as its immediate, specific aim the elimination of the corrupt and growing practice of commercial bribery. To this work it proposes to devote its first, vigorous attention, and it is supporting national legislation for the suppression of this form of business graft.

The secret giving of commissions, money, or other things of value to employees of customers, for the purpose of influencing their buying powers, is a dangerous evil more widespread than is acknowledged, and one which is growing.

Those concerned with both the dye and textile industries, to go no further, know of at least one important phase of industry wherein this form of corruption was practised by a foreign competitor to the eventual great detriment of both domestic trades. And for this reason alone they should be particularly interested in co-operating with and supporting any organization whose principal object is the stamping out of all present manifestations of this evil and the prevention of its future recurrence.

There is pending in Congress a bill, H. R. 10159, introduced at the direction of the House Committee on the Judiciary, on January 27, 1922, entitled "A Bill to further protect interstate and foreign commerce against bribery and other corrupt trade practices." This bill is now No. 133 on the House Calendar.

Full details as to the provisions of this proposed law may be had from the secretary of the new organization, H. J. Kenner, 110 West Fortieth Street, New York City, and readers are urged to investigate further and, upon being satisfied as to the standing of the Commercial Standards Council, to act if possible upon its suggestions.

#### TRIPHENYL-METHANE COLORS

British Dyestuffs Corporation, Ltd., have patented a process (B.P. 165,658) for preparing new triphenyl-methane colors by condensing 2,4 dichloro-5-nitro-benzaldehyde and the corresponding 2-4-5-tri-chlor-benzaldehyde

with a mono-alkyl-ortho-toluidine, and oxidizing the leuco body obtained. The coloring matters produced are pure greenish blue basic dyes of superior fastness to light.

#### GUESSWORK IN THE DYEHOUSE

(Concluded from page 228.)

Little, how much less should one try to guess at temperatures other than 212 deg.?

Can you afford to be inaccurate? You do not guess at the amount of dyestuff you add to the dye bath; you weigh it. Then why do you guess at the temperature at which you dye, when it can be measured easily and accurately? In matching you endeavor to duplicate the amounts of dye, acid, or mordant, length of time in the bath, etc., as near as possible. You keep records of these facts, but have you any data concerning the temperatures? Often those perplexing little differences between two or more batches or pieces which occasionally turn up can be traced to a difference in temperatures somewhere along the line.—"Canadian Dyer and Color User."

#### ACID WOOL DYE ON COTTON

A German patent for the production of shades fast to light on vegetable fibers is based upon the fact that gelatine is rendered insoluble by formaldehyde. The material is treated in a solution containing gelatine acid wool dye and glycerine at a temperature under water boil. An after treatment with formaldehyde, either gas or solution, is then given, after which the material is dried and calendered.

#### THE INFLUENCE OF THE CONCENTRATION OF BLEACH LIQUORS ON THE STABILITY OF COTTON IN PROLONGED CHLORINE BLEACHING

P. Herman and H. Frederking; *Textilberichte*, 1921, 2, 428, through *Journal of the Textile Institute*.

If sufficient chlorine is present the velocity of bleaching is proportional to the concentration, but if the chlorine content is low it depends on the rate of diffusion. The thicker the fiber is, the more rapidly it should be bleached. The authors have carried out a series of experiments, using the same material and bleach as in a previous communication (see *Jl.*, 1921, 12, 446). The duration of each bleaching was 75 minutes with a chlorine content of 1:1,000; 5, 10, and 16 bleachings reduced the tensile strength to the same extent as 18, 35, and 50 with a 0.5:1,000 concentration. Comparing a concentration of 2:1,000 with 1:1,000 active chlorine 4, 10, and 20 bleachings resulted in the same reduction in strength as 10, 28, and 50 with a concentration of 1:1,000. Seven bleachings with 2:1,000 concentration gave the same loss in strength as 50 of 0.5:1,000. Generally, by doubling the chlorine concentration the loss in stability was increased threefold. The weight per square meter was reduced about 9 per cent. The elasticity in the case of concen-

trations of 2:1,000 fell about 20 per cent, but in the case of 1:1,000 it rose to a maximum of 113 per cent after twenty experiments and then fell to 105 per cent after 50 bleachings.

## Foreign Dyes Licensed by Treasury Department for February Import

Swiss Contribution Nearly Four Times That of January—Germany Makes Substantial Gain—  
England Falls Off

**L**ICENSED imports of dyestuffs for February, which totaled 400,269 pounds, were nearly double the January importations, which were but 201,221 pounds. This is likewise a large gain over the 308,787 December total, and was the largest amount licensed for importation to this country since last November, when the total was 768,858 pounds.

Germany, leader for the month, bettered her January figure of 117,275 pounds by sending us 161,012 pounds in February. England, on the other hand, slumped from 46,550 pounds in January to 25,500 pounds during the second month of 1922. Principal responsibility for the great total increase in poundage lies with Switzerland, which sent us 113,757 pounds as against the unwontedly small contribution of 37,396 pounds made during January.

Following is the complete list giving the types and quantities of dyestuffs for the importation of which into the United States licenses were granted by the Treasury Department, Division of Customs, Dye and Chemical Section, during February. This tabulation is being issued by the American Dyes Institute, and it is announced that anyone interested in the manufacture of dyestuffs who has not received a copy may obtain one by application to that organization's headquarters, 320 Broadway, New York City.

An appended note by the Treasury Department states: "Licenses shown by this list to have been issued for particular commodities must not be considered as a precedent or assurance that favorable action will be taken on future applications for similar commodities. The Treasury Department, Dye and Chemical Section, announces in special cases that it is its practice to consider any special evidence that may be submitted by manufacturing consumers of dyestuffs tending to prove that the American commodity, while satisfactory in general or for some lines, will not meet the requirements as to quality or adaptability for particular manufacturing purposes."

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Acid Alizarine Black R.....	2,118	8,000
Acid Alizarine Gray G.....	5	....
Acid Anthracene Brown R.....	1,000	....
Acid Anthracene Brown RH Extra.	1,000	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Acid Cyanine BF.....	5	....
Acid Magenta .....	125	....
Acid Ponceau EXEX.....	....	551
Acid Rhodamine BG.....	100	....
Acid Pure Blue R Supra.....	....	2,800
Algol Brown G Powder.....	75	....
Algol Brown R Paste.....	125	....
Algol Corinth R Paste.....	500	....
Algol Pink R Paste.....	10	....
Algol Red B Paste.....	2,500	....
Algol Red FF Extra Paste.....	575	....
Algol Red 5G Paste.....	225	....
Algol Yellow 3G Paste.....	500	....
Alizarine SDG Paste.....	50	....
Alizarine Astrol B.....	820	....
Alizarine Black S Paste.....	1,000	....
Alizarine Black T.....	5	....
Alizarine Blue SAE.....	250	....
Alizarine Blue SB Powder.....	100	....
Alizarine Blue SKY.....	130	....
Alizarine Blue SAWSA.....	100	....
Alizarine Blue Black B Powder....	100	....
Alizarine Blue Black 3B.....	1,400	....
Alizarine Blue Black BT.....	500	....
Alizarine Bordeaux BB.....	5	....
Alizarine Celestol R.....	1,000	....
Alizarine Cyanine GG Powder....	3,000	....
Alizarine Cyanine Green G Ex. Pdr.	900	....
Alizarine Delphinol BB (from Eng- land 1,200 lbs.) .....	....	....
Alizarine Emeradole G... ..	100	....
Alizarine Fast Light Blue SE.....	....	500
Alizarine Green S Paste.....	500	....
Alizarine Indigo 3R Paste.....	1,000	....
Alizarine Indigo Green B Paste....	594	....
Alizarine Irisol R.....	800	....
Alizarine Light Blue SE.....	....	4,200
Alizarine Orange Paste.....	800	....
Alizarine Orange AO 20% Paste (from England 500 lbs.).....	....	....
Alizarine Red S.....	400	....
Alizarine Red SDG.....	200	....
Alizarine Red SX 20% Paste.....	450	....
Alizarine Red W Powder.....	800	....
Alizarine Rubinoles 3G... ..	550	....
Alizarine Rubinoles GW Powder....	2,000	....
Alizarine Rubinoles R Powder.....	1,001	....
Alizarine Saphirol B.....	800	....
Alizarine Saphirole SAE.....	250	....
Alizarine Saphirole SE.....	900	....
Alizarine Saphirole SE Conc.....	560	....
Alizarine Saphirole WSA.....	552	....
Alizarine Sky Blue B Powder.....	1,250	....
Alkali Blue 3R Conc.....	2,000	....
Alkali Fast Green 3G.....	300	....
Anthracene Blue SWGG Ex. Powder	25	....
Anthracene Blue WG Paste.....	1,500	....



Designation of Dye	Germany (lbs.)	Switz. (lbs.)	Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Anthracene Chrome Brown EB.....	3,505	....	Chrome Acetine Blue S.....	....	220
Anthraflavone G.....	475	....	Chromexan Brilliant Blue G.....	110	....
Anthraflavone GC.....	2,200	....	Ciba Blue 2B Powder.....	....	968
Anthraquinone Blue Green BX.....	?	....	Ciba Blue 2BD Paste.....	....	3,850
Anthraquinone Blue Green BXO...	442	....	Ciba Blue G.....	....	3,630
Azure Blue N.....	500	....	Ciba Bordeaux B Paste.....	....	220
Benzo Copper Blue 2B.....	1,000	....	Ciba Green G 10% Paste.....	501	....
Benzo Fast Black L.....	690	....	Ciba Orange G Powder.....	....	330
Benzo Fast Blue G.....	201	....	Ciba Pink BG 20% Paste.....	....	55
Benzo Fast Blue 4GL.....	900	....	Ciba Red R 20% Paste.....	220	300
Benzo Fast Brown 3GL.....	500	....	Ciba Rose BG.....	....	440
Benzo Fast Heliotrope BL.....	520	....	Ciba Scarlet G 20% Paste.....	....	165
Benzo Fast Heliotrope 4BL.....	10	....	Ciba Scarlet G Powder.....	....	440
Benzo Fast Red 8BL.....	500	....	Ciba Violet B Paste.....	....	4,400
Benzo Fast Heliotrope BL.....	10	....	Ciba Violet B Powder.....	....	1,100
Benzo Fast Heliotrope 2RL.....	50	....	Ciba Violet 2B Powder.....	....	220
Benzo Fast Orange 2RL.....	50	....	Ciba Violet R.....	....	1,210
Benzo Fast Red 8BL.....	1,320	....	Cibanone Blue 3G Paste.....	....	830
Benzo Fast Yellow GL Extra.....	500	....	Cibanone Orange R.....	....	55
Benzo Fast Yellow RL.....	50	....	Congo Orange G.....	200	....
Benzo Light Blue 4GL.....	220	....	Cross Dye Green 2G Conc. (from England 1,900 lbs.).....	....	....
Benzo Light Bordeaux 6BL.....	50	....	Cyananthrol BGA.....	125	....
Benzo Light Brown 3GL.....	100	....	Cyananthrol BGAOO.....	1,005	....
Benzo Light Orange 2RL.....	2	....	Cyananthrol RXO.....	301	....
Benzo Olive.....	100	....	Cyanole FF.....	5	....
Benzo Red 12B.....	1,220	....	Cyanole Extra.....	36	....
Benzo Rhoduline Red 3B.....	100	....	Delta Purpurine 5B Extra.....	220	....
Benzo Violet O.....	448	....	Delta Purpurine 5B.....	220	....
Biebrich Acid Violet 7B.....	100	....	Developer NB.....	....	250
Black Lake.....	50	....	Diamine Azo Orange 2R.....	10	....
Brilliant Benzo Fast Violet BL....	271	....	Diamine Brown B.....	100	....
Brilliant Benzo Fast Violet 4BL....	57	....	Diamine Bronze G.....	25	....
Brilliant Benzo Green B.....	200	....	Diamine Catechine B.....	175	....
Brilliant Benzo Violet B.....	501	....	Diamine Catechine 3G.....	50	....
Brilliant Benzo Violet 2RL.....	101	....	Diamine Cutch.....	10	....
Brilliant Fast Blue B.....	50	....	Diamine Fast Black XN Ex. Conc..	5	....
Brilliant Fast Blue GG.....	50	....	Diamine Fast Bordeaux 6BS.....	599	....
Brilliant Indigo 4G.....	201	....	Diamine Fast Orange EG.....	400	....
Brilliant Milling Blue.....	50	....	Diamine Fast Orange ER.....	500	....
Brilliant Milling Blue B.....	105	....	Diamine Orange F.....	10	....
Brilliant Sky Blue 8G Extra.....	55	....	Diamine Scarlet 3B.....	500	....
Brilliant Sulphon Red B.....	..	3,250	Diamine Steel Blue L.....	10	....
Brilliant Sulphon Red 10B.....	....	1,000	Diaminogene Sky Blue N.....	10	....
Brilliant Wool Blue FFR Extra....	25	....	Diaminogene Blue NA.....	4,000	....
Carbazol Yellow W.....	10	....	Dianol Violet R (from England 300 lbs.).....	....	....
Chinoline Yellow.....	....	2,000	Diazamine Blue BR.....	....	500
Chinoline Yellow KT Ex. Conc.....	1,920	....	Diazanil Pink B.....	200	....
Chloramine Red B.....	....	5,710	Diazine Black.....	250	....
Chloramine Red 3B.....	....	3,100	Diazine Black G.....	500	....
Chloramine Red 8BS.....	3,200	....	Diazo Brilliant Black B.....	2,700	....
Chloramine Red 8BS Conc.....	2,250	....	Diazo Brilliant Scarlet 6B Extra....	251	....
Chlorantine Fast Bordeaux 3BL....	....	660	Diazo Brilliant Scarlet 2BL Ex. Conc.	1,000	....
Chlorantine Fast Red 7BL.....	....	239	Diazo Brown 3G.....	200	....
Chlorantine Violet 4BL.....	....	561	Diazo Light Violet BL.....	25	....
Chlorantine Fast Yellow 4GL.....	....	440	Direct Brown 2G.....	....	3,300
Chlorantine Fast Yellow RL.....	....	440	Direct Catechine GR.....	....	660
Chlorazol Fast Red K (from England 100 lbs.).....	....	....			

Designation of Dye	(lbs.) Germany	(lbs.) Switz.	Designation of Dye	(lbs.) Germany	(lbs.) Switz.
Eclipse Brown 3GK.....	....	4,500	Indanthrene Violet RR Extra.....	50	....
Erio Chrome Red B.....	....	2,750	Indigo MJB6B .....	200	....
Erio Chrome Verdon S.....	....	5,500	Indocyanine B .....	5	....
Euchrysine GRNTN .....	440	....	Indocyanine RRF .....	5	....
Euchrysine RRD .....	135	....	Ink Blue Aniline BJTNO.....	300	....
Fast Acid Blue B.....	200	....	Janus Red B.....	220	....
Fast Acid Magenta G.....	100	....	Light Green SF Yellowish.....	200	....
Fast Green Bluish.....	500	....	Lithol Fast Orange R Powder.....	1,000	....
Fast Green Extra Bluish.....	100	....	Metachrome Blue Black 2BK.....	500	....
Fast Light Yellow 2G.....	200	....	Methyl Lyons Blue.....	....	500
Fast Mordant Yellow G Powder...	20	....	Methyl Silk Blue New.....	....	500
Gallophenine W .....	500	...	Methyl Violet 6B 80 yarov.....	55	....
Genuine Madder Lake YS Yellow			Methyl Violet NFS.....	50	....
Shade (from England 300 lbs.) ....	....	....	Methylene Blue BG Conc.....	25	....
Geranine G .....	12	....	Methylene Green G.....	25	....
Guinea Violet 4B.....	2,000	....	Milling Yellow 3G.....	50	....
Hansa Yellow G.....	1,000	....	Milling Yellow O.....	100	....
Hansa Yellow 5G.....	1,000	....	Memoza Z Conc.....	....	2,700
Helindone Brown G Powder.....	110	....	Naphtogene Blue B.....	2,025	....
Helindone Brown 2R Paste.....	1,102	....	Naphtamine Fast Blue B.....	250	....
Helindone Green G Paste.....	100	....	Naphtamine Fast Green B.....	100	....
Helindone Pink AN Paste.....	800	....	Naphtamine Fast Green Y.....	250	....
Helindone Pink AN 10% Paste.....	400	....	Naphtamine Fast Violet 2B.....	50	....
Helindone Pink B Extra.....	200	....	Naphtamine Yellow BN.....	25	....
Helindone Pink BN .....	1,975	....	New Methylene Blue N.....	11	....
Helindone Pink R Extra Paste.....	250	....	Night Blue .....	5	....
Helindone Red 3B Paste.....	500	....	Nigrosine T .....	500	....
Helio Bordeaux BL Powder.....	50	....	Nigrogene B .....	200	....
Helio Fast Violet AL.....	160	....	Nile Blue BX.....	5	....
Hydron Blue G 30% Paste.....	510	....	Nitrosamine Paste .....	50	....
Hydron Blue R 30% Paste.....	1,300	....	Omega Chrome Red B.....	....	2,000
Hydron Bordeaux B Paste.....	50	....	Oxamine Acid Brown G.....	2,000	....
Hydron Bordeaux B Double Paste..	20	....	Oxydiaminogen ED .....	200	....
Hydron Bordeaux R Double Paste..	20	....	Paper Fast Bordeaux B.....	25	....
Hydron Brown G Paste.....	70	....	Patent Blue V.....	4,000	....
Hydron Brown R Paste.....	70	....	Patent Phosphine G.....	....	440
Hydron Green B Paste.....	20	....	Patent Phosphine R.....	....	110
Hydron Green G .....	20	....	Peri Wool Blue B.....	100	....
Hydron Orange R Paste.....	70	....	Peri Wool Blue G.....	100	....
Hydron Pink FB Paste.....	270	....	Permanent Red .....	50	....
Hydron Pink FF.....	295	....	Phosphine Extra .....	5	....
Hydron Scarlet BB Paste.....	21	....	Phosphine 3R .....	2,100	....
Imperial Scarlet 3B.....	100	....	Prune Pure .....	....	3,000
Indanthrene Blue BCS Powder.....	23,150	....	Pyramine Orange R.....	1,000	....
Indanthrene Blue GCD Dbl. Paste..	2,000	....	Pyrazole Orange G.....	....	6,500
Indanthrene Blue 3G Powder.....	500	....	Pyrogene Direct Blue RL.....	....	480
Indanthrene Blue RS Triple Powder	50	....	Pyrogene Direct Blue RL Conc.....	....	400
Indanthrene Claret B Extra Paste...	2,450	....	Pyrogene Yellow Brown RS.....	....	660
Indanthrene Golden Orange G Dbl.			Rapid Fast Red B.....	10	....
Paste .....	700	....	Rapid Fast Red GL.....	10	....
Indanthrene Golden Orange RN Ex.	500	....	Rhodamine B Extra.....	75	..
Indanthrene Golden Orange RRT			Rhodamine G .....	22	....
Paste .....	9,325	....	Rhodamine 6GDN Extra.....	700	....
Indanthrene Pink B Dbl. Paste.....	500	....	Rhodamine 6GH .....	....	55
Indanthrene Red BN Extra Paste...	1,500	....	Rosanthrene R .....	....	55
Indanthrene Red Violet RRN Paste	1,000	....	Rosanthrene Orange R.....	....	55
Indanthrene Violet BN Ex. Paste...	5,500	....	Rosinduline 2B Bluish.....	2	....



## FASTNESS TO LIGHT

By E. W. PIERCE

(Continued from page 222.)

the samples for the same time until one or the other shows signs of fading. This, in fact, is almost as far as we dare go and the meager information has to satisfy us.

We may be operating a mill and have a desire to enter a bid on a Government contract. We find that after enumerating exactly the quality of the stock, weave, weight, finish, etc., and several very positive chemical tests, we are informed that the sample must stand thirty days' exposure as well as the standard sample. No account is taken as to the part of the year which shall furnish those thirty days; the latitude, however, may be presumed to be that of Philadelphia.

It is easy to see how the mill chemist might deceive himself regarding the actual fastness of the dyes he intended using, should he make his exposures in December and then have the Quartermaster's chemist reject the goods after a test in August.

### COMPARATIVE FASTNESS, AND STRENGTH OF DYEINGS

A case like this would be rather easy to control, because the tests are made on a definite shade and strength of color; but should we wish to know the comparative fastness of, say, Tartrazine and Crystal Orange GG, or Alizarine Saphirol, another difficulty arises. As a 2 per cent dyeing of any color requires twice as long to fade as a 1 per cent dyeing, and as each particular dye has its own independent strength (compared to its own chemically pure grade), there is no reason why each dye should be tested at 1 per cent, nor is there any measure which will tell us how strong each respective dye should be dyed in order to be on an equal basis with the others.

### METHOD OF TESTING FOR COMPARATIVE FASTNESS

We might proceed, as in the test for level dyeing, by selecting from each class of dyestuffs a blue, red and yellow of the very highest fastness to light, and from them determine a formula for a neutral gray. Then, whenever a dye of any class was to be tested, omit its equivalent from the gray and rematch the gray, using the new color which is being tested. Several yellows of various tones, likewise blues and reds, would then each form part of a number of grays of equal shade. A comparative exposure of these samples would then show us how equivalent quantities of similar colors stood the exposure, rather than how an arbitrary 1 per cent of each was affected.

### VARIABILITY OF A GIVEN ULTRA-VIOLET RAY SOURCE

So far we have only comparative tests but no definite relations. We speak of Diamine Sky Blue FF as being fugitive and of Solamine Blue FF as being fast

Designation of Dye	(lbs.) Germany	(lbs.) Switz.
Rosinduline GFX .....	353	....
Saba Phosphine 2G Conc.....	....	2,000
Saba Phosphine N Conc.....	....	2,000
Sulphur Pyrogene Green 3G.....	....	308
Supramine Yellow R.....	50	....
Thiazine Red RXX.....	10	....
Thioflavine .....	....	500
Thioflavine T .....	35	....
Thiogene Violet B.....	5,000	....
Thio Indigo Rose BN Extra Paste..	310	....
Thionol Brilliant Green GG.....	....	7,000
Thionol Brown R (from England 5,000 lbs.) .....	....	....
Thionol Green DY (from England 200 lbs.) .....	....	....
Thionol Yellow GR (from England 10,000 lbs.) .....	....	....
Thionol Yellow 3RD (from England 5,000 lbs.) .....	....	....
Triazol Discharge Brown GGX.....	....	1,100
Trisulphon Bronze B.....	....	2,000
Trisulphon Brown B.....	....	2,000
Trisulphon Brown GG Conc.....	....	3,000
Turquoise Blue G.....	50	....
Ultrio Violet NO.....	....	1,000
Ursol DF .....	100	....
Vat Pink B Extra.....	110	....
Vat Pink R Extra.....	10	....
Victoria Blue B Conc.....	35	....
Viridin Lake .....	700	....
Viridin S Powder.....	5	....
Washmarine .....	110	....
Water Blue .....	200	....
Wool Fast Blue BL.....	500	....
Xylene Cyanol FF Extra.....	....	509
Xylene Red B .....	....	2,000
Yellow Developer C.....	....	1,320
Yellow Developer G.....	....	220
<b>Bronze Blue</b> .....	10	....
Madder Lake .....	60	....
Madder Lake (from England 1,000 lbs.) .....	....	....
Madder Lake BB Extra.....	60	....
Reflex Blue 1048K.....	10	....
Blue Lake 41.....	1,000	....
Totals:		
Germany .....	161,012	
England .....	25,500	
Switzerland .....	113,757	
Grand Total .....	400,269	

The Phoenix Knitting Works, Inc., 208 Broadway, Milwaukee, Wis., is about to erect a large new concrete building for a central dyeing and finishing plant, the estimated cost of which is \$400,000. Lockwood, Greene & Co., of Boston and Chicago, are the engineers.

to light, but who can say whether the latter will stand fifty times the exposure of the former or only fifteen times as much?

Several years ago I hoped that I had a solution for this problem in the quartz mercury vapor lamp, and after the first experiments many new types of lamps were developed. Shortly afterward a series of tests were run at the Bureau of Standards which showed that the output of ultra-violet rays slowly but steadily diminished, making the source of light as uncertain as sunlight itself.

#### CHEMICAL REACTIONS PRODUCED BY ULTRA-VIOLET RAYS

I also found that ultra-violet ray exposure caused the effect of an alkaline reduction on the dyestuffs. Naphthol Yellow S, which fades rapidly in sunlight, only becomes redder and duller under the ultra-violet rays, and Indanthrene Yellow, which stands sunlight exceptionally well, becomes green under the lamp.

The exposure under the ultra-violet rays is always dry and hot, while weather exposure allows the re-absorption of moisture which, the next day, is partly converted into hydrogen peroxide. The sun's rays do contain many ultra-violet rays, but the assortment is different from those emanating from the quartz mercury vapor tube, or from the intensified arc. These conditions, it would appear, limit the use of the lamps to comparative testing of similar products, subject to all the other conditions enumerated above.

#### FURTHER OBSTACLES TO QUANTITATIVE TESTING BY ULTRA-VIOLET LIGHT

It has been suggested that we measure the intensity of the light while the exposure is being made. The decomposition of ferrous oxalate solution or ammonium succinate in the presence of uranium salts, and the measurement of the liberated gas, seemed practical, but in both cases I found that the fading of the samples took place before enough gas could be collected to be capable of measurement by ordinary laboratory appliances.

A writer recently suggested saturating filter paper with a definite strength of eosine solution, and drying. Pieces of the paper were to be exposed with the samples and as soon as one piece of the eosine paper was faded out to a white a new one was exposed. The total exposure was measured by the number of eosine units required. All dyes do not fade out to the white cloth, however. How, then, are we to judge when the fading has reached its maximum?

#### A SUGGESTION

I have but one suggestion along the line of quantitative exposure, but at present have no opportunity of developing it. We will require a long surface exposed to the sun and a mechanical device, run by clockwork,

to slowly draw a tape, dyed with the color being tested, from a concealed spool so that while the end gets the full length of exposure, a new part is being constantly fed out. This device would have to be stopped when the sun was not shining. When the test of several colors, simultaneously, was completed, the strips would show a progressive fading that could be compared by measuring the distance from the last spot exposed to the spot where fading was complete. The ratio between fast and fugitive colors would be referred to in inches or centimeters. The mechanism might be reversed and the cloth strips remain fixed but covered by a screen that slowly retreated and gradually left more of the samples exposed. For very fast dyes a centimeter a day would be speedy enough, but for very fugitive ones it would be nearer to a meter a day.

#### ADDITIONAL FACTORS

Whatever methods may be used, it should be borne in mind that exposure under glass is very different from the weather test. Ultra-violet rays in sunlight do not pass through the thinnest glass, but there are some light rays that pass through glass and are capable of refraction and reflection, and still cause chemical changes; otherwise photography would not be possible. The weather test is, of course, much more severe, and is likely to be disguised by dirt and soot, which must be removed before comparison is made.

It is earnestly hoped that this very important feature of dyestuff testing will soon receive some practical aid from those most interested in it. The public, when it talks about fast dyes, generally means light-fast. We know they do not require the best dyes made for some of the less important materials, but they do look for what the pre-war sample cards often called "sufficient fastness." Before we can act really intelligently in such a matter we must put ourselves in a position to get more definite information regarding the dyes we are using or selling.

Of course, there are certain well-known dyes whose fastness has been established by actual use—of these we are sure; but when the temptation is offered to use something "just as good," then the remarks given above have a greater significance.

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#### THE FIXING OF IRON MORDANTS ON SILK

In dyeing silk black, the fixation of the nitrate of iron is effected generally by means of warm solutions of soap applied after the silk has been given many passages through the iron solution. The duration of the treatment with soap extends to 2 to 3½ hours, according to circumstances. An appreciable economy in time, labor and material has been realized since the introduction of the froth method of soaping. A reduction in the consumption of soap may be obtained by suspending in the soap liquor small sacks containing silk worm chrysalides or silk wastes containing chrysalides, or by adding the oily liquor obtained after boiling these in water.



*Example:* In the upper part of a wooden or iron vessel about 7 meters long is arranged a series of about 50 hooks on which are suspended the hanks of silk which have been treated in the nitrate of iron solution. At the base of the dyeing vessel is arranged a serpentine pipe for heating purposes. The hanks reach down to within 60 cm. of the bottom of the vessel. An amount of water sufficient to reach a height of about 25 to 30 cm. (about 5,000 liters) is run into the vessel. A mixture is made of 5 kilo. soap and 25 kilo. silk worm chrysalides. The liquor is brought to the boil to produce the froth which rises to the top of the vessel and completely envelops the silk. This treatment is continued for about one hour. The same liquor may be re-used for at least ten successive lots, freshening after each lot with a little soap and more water to maintain the original level, without, however, adding any further quantity of chrysalides. As the cost of the chrysalides is about half that of the soap, the advantage is obvious. The proportion between the chrysalides and the soap may of course be varied, to the extent in some instances of using no soap at all.

## Review of Recent Literature

*The Popular Chemical Dictionary.* C. T. Ginzett, F.I.C., F.C.S. 547 pages;  $5\frac{1}{2} \times 8\frac{1}{4}$ ; illustrated; cloth; \$4.50. New York, D. Van Nostrand Company.

The author, one of the founders of the Institute of Chemistry, and past vice-president of the Society of Public Analysts, has provided a handbook of chemical information, accurate in detail and comprehensive in character dealing in an up-to-date way with chemistry as a science, modern theories, manufacturing processes, chemical and natural products including acids, alkaloids, alkalies, alloys, balsams, coal, dyes, essential oils, explosives, fats, fertilizers, foods, glasses, gums, inks, lubricants, metals, oils, ores, paints, perfumes, petroleum, refractories, rubber, resins, sewage, silk, sugars, tanning materials, tar products, varnishes, vitamins, waxes, etc.

There are sections dealing also with the subjects of heat, light, electricity, magnetism, the constitution of matter, atomic structure, the electron theory, radio-activity, catalysis, colloids, enzymes, etc., in compendious critical style, and the various other ramifications of chemistry, such as plant and animal life.

*Textile Mathematics, Part 2.* Thomas Woodhouse; 123 pages,  $4\frac{3}{4} \times 7\frac{1}{4}$ , illustrated; by Thomas Woodhouse and Alexander Brand. Blackie & Son, Glasgow.

The second part of this work carries the student through more advanced stages of mathematics for textile work, the contents being arranged under the following heads: Ratio, proportion and variation; averages; per-

centages; loss and regain; mixtures, proportions and costs; indices, use of logarithms; trigonometrical ratios; yarn counts; exercises; useful data; logarithm tables. The volume is a very useful handbook for textile mill men, including not only those who are making their first study of the subject, but also those who have taken a course in arithmetic, algebra and geometry. Without constant practice, mathematical calculations, the knowledge gained in the class room quickly fades from the memory, and in such cases this little book will prove to be a friend indeed when the textile mill man finds it necessary to use his rusty mental equipment.

*The Jute Industry.* T. Woodhouse and P. Kilgour. London; Sir Isaac Pitman & Sons, Ltd. 3s. net.

This is one of "Pitman's Common Commodities and Industries" series, and treats on the whole of the jute industry, from the growing of the seed to the finished cloth. It will be understood that in dealing with jute cultivation, retting, assorting, and baling jute fiber, bale opening, batching, carding, drawing frames, roving frames, spinning, twisting, reeling, winding, warping, beaming, dressing, tying-in, drawing-in, weaving, and finishing, in the compass of 130 pages, the treatment is necessarily brief, but the explanations are lucid and concise without being too technical. The value of the work is increased by the inclusion of a large number of illustrations, and these, together with the text, enable anyone with no previous knowledge of the subject to follow the operations intelligently and become informed of the general routine of jute manufacture. The book will serve as a useful introduction, but those who are in or desire to enter the industry will soon want something more detailed.

*The Cotton Industry in France.* R. B. Forrester, M.A. Manchester. The University Press. 10s. 6 d. net.

This is a report presented to the electors of the Gartside scholarships, and the volume will form a companion with the descriptions of the cotton industry in America, Germany, and Switzerland which have been written by other Gartside scholars. The material for the present report was collected by the author during visits to France in 1910, 1911, and 1912, and supplemented by later inquiries. The object of the author has been to give a comprehensive survey of the conditions which prevailed in the cotton industry of France, to point out the characteristic features of recent development, and in certain respects to contrast its position with that of the industry in other countries. The author deals with the growth, magnitude, and geographical distribution of the cotton industry in France. He touches briefly on the related industries of dyeing, bleaching, finishing, and printing, and refers to the numerous specialized branches of manufacture, such as ribbons, lace, embroidery, etc. A lengthy chapter treats on the working conditions of the operatives and industrial organization. Later chapters deal with commercial organization and foreign trade;

employers' associations and industrial policy; labor conditions, wages, and trade unionism; schemes of social welfare, social legislation, and the standard of living, with details of retail prices. The book is well written, and gives much useful information about the cotton industry in France that should be specially valuable to those who desire to become acquainted with the conditions prevailing in other countries.

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*Textile Machine Drawing.* Thomas Woodhouse and Alexander Brand; 124 pages 4½x7; illustrated. London, Blackie & Son.

The value of a knowledge of machine drawing to students of textile processes has led Messrs. Woodhouse and Brand to prepare this handbook, which treats the subject of textile machine drawing under the following heads: Instruments; Preliminary Exercises; Construction of Geometrical Figures; Orthographic Projection; Bolts, Screws, Rivets and Keys; Sketching and Drawing of Details; Drawing to Scale; Small Assemblies.

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*Traite de Tissage au Jacquard.* D. de Pratt, Ch. Beranger, Paris, France.

This is an interesting and comprehensive work in French covering the development and technology of jacquard weaving. It is preceded by a historical account concerning the invention of the jacquard loom and follows with a detailed discussion of the following topics: Various Mechanisms; Classification of Looms; Accessories; Make-up and Execution of Design; Putting on Cards; Interweaving, Binding and Tying of the Cards; Manufacture of Fabrics Made on the Jacquard Mechanism to Various Branches of the Textile Industry; Miscellaneous Data Concerning the Jacquard Loom.

The author, a civil engineer, was formerly director of a spinning and weaving works and is now chief editor of "L'Avenir Textile"

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D. Van Nostrand, New York, announce in press "Principles and Practices of Fur Dyeing," by William E. Austin, consulting chemist. This work will be illustrated; 6x9; cloth; about 200 pages, and will be a practical manual as well as a complete treatise on the subject of fur dressing and dyeing introduced by a chapter on the differences in furs of the various animals, the effects of climate, age and season; the durability, relative weights, and the valuation of furs, and a description of the important furs. The contents include: Furs and Their Characteristics; Structure of Fur; *Fur Dressing*: Introductory and Historical, Preliminary Operations, Tanning Methods, Drying and Finishing. *Water in Fur Dressing and Dyeing*; *Fur Dyeing*: Introductory and Historical, General Methods, Killing the Furs, Mordants, Mineral Colors Used on Furs, Fur Dyeing and Vegetable Dyes, Aniline Black, Oxidation Colors, with Coal Tar Dyes. Bleaching of Furs; Bibliography.

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

A. T. C.—*Question*: How are copying printing inks made? I do not mean the kind used for rubber stamps but the thick, pasty variety used by regular printers.

*Answer*: Copying printer's inks are made by dissolving basic dyes in hot glycerine until a saturated solution results. They sometimes have added to them tannic acid and phenol to prevent recrystallization and when cool form thick pastes which can be used on the press in the usual way. Some varieties are mixed with the regular oil inks. While the two kinds are not easily mixed, the viscosity of the pastes prevents separation.

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M. F.—*Question*: What class of dyes is most suitable for dyeing feathers?

*Answer*: Practically all the basic and acid dyes are used for feather dyeing but, of course, are not to be used together. Feathers should be well scoured with soap and warm water before dyeing. Otherwise they will show many bare spots. The basic dyes are applied at not over 120 deg. Fahr. in a bath that is nearly neutral. Some of the acid dyes may be applied at a low temperature and require very little acid, but those that exhaust slowly on wool require more acid and a full boil. It is better for the feathers if they can be dyed at a lower temperature and there should be no great difficulty in getting a line of colors to work under these conditions.

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J.G.K.—*Question*: Which dyes are used for coloring coated paper and how are they applied?

*Answer*: The dyes are not applied directly to the paper but color only the coating material. The coating is composed of well-washed china clay suspended in water with sufficient binding material to hold it on the paper. The binder may be starch, glue, casein, etc. The basic dyes are generally used when the coating is being colored direct, although sometimes color lakes, made from acid dyes, as well as chemical and mineral pigments, are added to the mass. The mills making coated paper generally buy their paper in rolls and run it through the coating



machine which applies the coating mass to one side of the sheet, dries it and then calenders it with more or less pressure, according to the gloss desired. The gloss is also regulated by the nature of the binder, casein being now generally used for the highest gloss and starch for dull finish.

R.F.—*Question*: I have to dye a large quantity of wool waste a deep brown fast to fulling. It already has a variety of colors and I am not sure they are all fast. Should I strip it first or will the fast dye on top make it sufficiently fast?

*Answer*: In all cases like this the safest procedure is to run the stock one hour at a boil with 3 per cent bi-chromate and 2 per cent sulphuric acid. This will strip some of the colors and fasten others. Then before dyeing reduce the free chromic acid by boiling one-half hour with 2 per cent oxalic acid. Wash well and dye with chrome mordant colors, taking care the raise in temperature is not too rapid so as to get the best leveling and fixation of dye, which is essential to perfect fastness.

R.K.M.—*Question*: In your issue of January 16, 1922, there was an article, *re* Acetyl Silk. Will you kindly let us know who is maker of this silk, and also the address?

*Answer*: You will note that this article was reprinted from the "Journal of the Society of Dyers and Colourists" and was, of course, of British origin. The silk in question is manufactured by the British Cellulose & Chemical Manufacturing Company, of Derby, England, under patents controlled by them. This firm, however, states that inquiries may be made of the American Cellulose Company, 681 Fifth Avenue, New York.

A new shade, on the order of a golden yellow, has been introduced under the name of "Dent de Lion" by H. R. Mallison & Co., Inc. It was brought out during February.

The Alpha Silk Company, 49 State Street, Paterson, N. J., will expend approximately \$50,000 to erect a new addition to its plant to be used for a dyehouse.

The Irving Worsted Company, Chester, Pa., will expend approximately \$50,000 to erect and equip an addition to its plant. Additional drawing and spinning equipment will be installed. The addition will comprise a main mill one story high and an adjoining office building two stories.

Broad-silk manufacturers are expecting crepes to predominate in the demand this spring, with satins and taffetas coming in for a fair share of favor. As to colors, they believe there will be a departure from blacks and whites and a reveling in bright hues. Yellows will be particularly favored, and bright, crisp greens.

## Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: \*Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

978.\*A commercial agent in France desires to act as representative with financial responsibilities for the sale of *cotton and woolen goods*. Quotations should be given c. i. f. French port. References.

979.\*—The agency is desired by a salesman in Chile of American firms for the sale of *cotton textiles, underwear*, and other articles of men's furnishings. Quotations should be given c. i. f. Chilean port or f. o. b. New York. References.

980.†—A mercantile firm in Japan desires to purchase yarns, such as *woolen, worsted, mousseline*, and *hosiery yarns, wool tops, woolen textiles*, etc. Quotations should be given c. i. f. Japanese port.

912.‡—A manufacturing firm in France desires to obtain *cotton* for the making of thread and cloth. Correspondence should be in French or German. References.

891.‡—A request has been received from a maker of military uniforms in Mexico for prices and samples of *gabardines* and *khakies*, direct from manufacturers. Quotations should be given f. o. b. factory. No reference.

1040 \*—An American consul in Palestine reports that a firm of commission agents desires to secure an agency for the sale of general merchandise, including ironware, *cotton textiles, hosiery*, metal bedsteads (four-post, French, and combination styles), alcohol, 95 per cent, in galvanized iron drums, with hoops, and similar goods suitable for trade in the Near East. Quotations should be given c. i. f. Jaffa or Haifa. Terms, 20 per cent with order and balance against documents. References.

1044.‡—A commercial representative in Norway wishes to be placed in touch with manufacturers and producers of sugar, flour, and every kind of foodstuffs, *all textile articles*, boots and shoes, leather, etc. No reference given.

1056.\*—A firm of commercial agents in Belgium desires to secure an agency on commission for the sale of *silk hosiery, knit goods, and mercerie fabrics*. Quotations are requested c. i. f. Belgian port. Correspondence should be in French. References.

848.‡—A business man in Persia, who is soon to organize a commercial house for the importation of goods, wishes to receive catalogues and samples, with a view to selling *textiles, clothing of all kinds* for men, women, and children; paper goods; electrical apparatus; and pharmaceutical products. Quotations should be given c. i. f. Basrah, Bouchir, and Mohammerah, and also parcel-post rates. No references given.

921.\*—There is a market in Czecho-Slovakia for *raw wool and cotton*. Quotations should be given c. i. f. German, French, or Holland ports. References.

914.\*—Inquiries have been received from Spain for agencies for the sale of lubricating oil, lumber and structural material, naval stores of all kinds, *cotton*, wheat flour and other breadstuffs, corn, brown and refined sugar, groceries, and agricultural machinery. Quotations should be given c. i. f. Corunna and Vigo. References.

903.†—The purchase is desired by a business man in South Africa of equipment for a tailoring shop for the repair of clothing and hosiery, including *knitting, darning, and other machines*; and also supplies such as *cotton and silk thread, and yarns*. Catalogues and price lists are requested. Cash to be paid.

904.‡—An inquiry has been received from a mercantile house in Jamaica for the purchase of millinery supplies, trimmed and untrimmed hats, notions, ribbons, *laces, thread, hosiery, novelties, underwear, waists, corsets, organdie, perfumes, toilet requisites, etc.* Catalogues are requested and salable samples will be paid for. Reference

1064.\*—A firm of importers in Egypt desires to secure the representation of manufacturers for the sale of wire nails, iron and steel goods, light leather, footwear, *gray and fancy cotton goods*, flour and semolina, preserved foods, and tin plate. Quotations should be given c. i. f. Alexandria. Terms: Cash against documents in local bank. References.

946.\*—An agency on a commission basis is desired by a mercantile company in Australia for the sale of *cotton piece goods, hosiery, and underwear*. Quotations should be given c. i. f. port of Victoria. References.

900.\*—An inquiry has been received from a merchant in Greece for the purchase of *women's fancy dress goods, silk, woolen and cotton goods, and woolen and*

*cotton blankets* for bedcovers. Quotations should be given c. i. f. Grecian port. Correspondence should be in French or Greek. References.

953.‡—A commercial agent in the British West Indies desires to secure the representation of firms for the sale on a commission basis of *cotton goods*, or any other goods which will find a market in those islands. References.

859.‡—A request has been received from a firm of importers and representatives in Chile that it be placed in communication with manufacturers of *fancy cotton flannelettes*. References.

860.\*—A dealer in housefurnishings goods in Austria desires to purchase general merchandise, such as *textiles, rubber office equipment sewing machines, shoes, and specialties*. An agency is also desired. Quotations should be given c. i. f. German ports. References.

1072.\*—A commercial agent in Argentina desires to secure the representation of firms for the sale of *textiles, especially silks and cotton goods*. Correspondence should be in Spanish. Reference.

1079.\*—There is a market in Czecho-Slovakia for *wool and cotton goods* and firms should forward quotations c. i. f. German, French, or Holland ports. References.

1081.\*—A trading company in Canada having large heated and unheated warehouse facilities for the storage and handling of all classes of merchandise, including machinery, desires to communicate with firms doing business in western Canada in the sale of machinery, *cotton goods, veilings and dress trimmings, California fresh fruits and nuts, and dried fruits*. Quotations should be given c. i. f. destination. References.

1085.\*—A commercial agent in England desires to secure the representation of firms for the sale of *sewing cotton, threads, etc.*, on reels and cops, for the use of wholesale clothiers, boot manufacturers, corset manufacturers, and others. Reference.



## Recent Patents

### Dyeing Machine

(1,407,265; February 21, 1922)

WILLIAM J. GOING, Schenectady, N. Y. (assignor to the Klauder-Weldon Dyeing Machine Company, Jenkintown, Pa.).

This relates to yarn treating machines, and with respect to its more specific features, to yarn dyeing apparatus, and this application is a division of application filed May 8, 1916, Serial Number 96,099.

One of the objects of the invention is the provision of a simple and practical yarn dyeing apparatus in which the yarn is continuously immersed in the dye liquid during the dyeing operation.

Another object of the invention is the provision, in apparatus of the character referred to, of rotary yarn sticks, and means coupled therewith, for preventing injury to the machine should the rotation of the sticks be abnormally resisted.

The accompanying drawing, Fig. 1, is a side elevation of an embodiment of the invention, showing the vat and operating devices, while Fig. 2 is a plan of Fig. 1.

The numeral 1 indicates a vat adapted to contain the treating liquid, as dye liquor for dyeing the field of yarn immersed in the vat. A cover for the vat is employed, and in the present embodiment this cover comprises two pairs of foldable cover sections 2 and 3 hinged to each

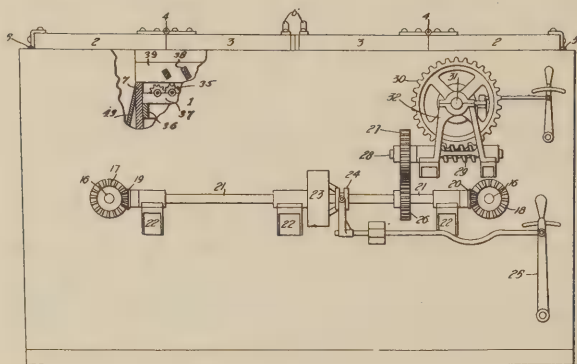


FIG. 1

other at 4, the sections 2 being hinged to the ends of the vat at 5 and the sections 3 being provided with a handle or other manipulating device 6. By this construction the section 3 may turn on its hinge 4 to partially uncover the vat, or both sections may turn on hinge 5 to wholly uncover the vat. One pair of the sections fold to the left, and the other pair to the right.

Within the vat are transverse partitions 7 and 8 spaced from both the top and bottom of the vat and providing chambers 9 and 10 at opposite sides of the vat, in each of which chambers are located means adapted to establish currents of the treating liquid. In the present em-

bodiment each current-establishing means comprises rotary propellers having flat vanes 11 extending across the vat near the center of its depth and journaled in longitudinally disposed partitions 12 and 13 forming the sides of the chambers 9 and 10. Each propeller comprises a plurality of propelling wheels provided with the flat vanes 11 referred to and intermeshing in a manner similar to that of a rotary pump, the axis of each pair of wheels being provided with intermeshing gears 14 and 15, so that when one is rotated the other will rotate therewith. The gears 14 are connected to rotate with short

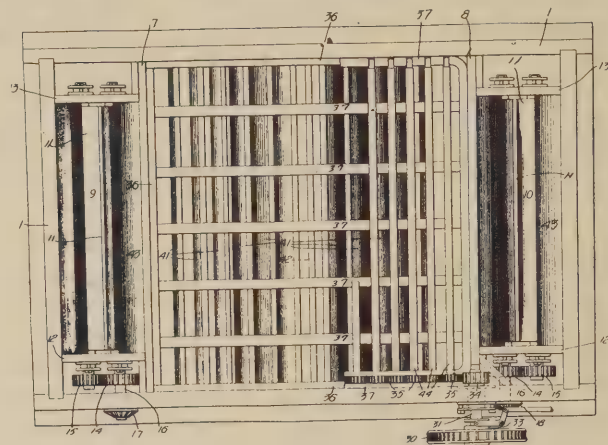


FIG. 2

shafts 16 suitably journaled in a side wall of the vat and provided with bevel gears 17 and 18 meshing with bevel gears 19 and 20 on the longitudinally disposed rotary shaft 21 journaled in brackets 22 on the side of the vat. 23 indicates a belt pulley rotatably mounted on the shaft 21 and adapted to be clutched to said shaft for driving the same by any suitable form of clutch having a clutch collar 24, splined to shaft 21, and which latter collar may be manipulated by a shift lever 25. The numeral 26 indicates a gear wheel rotating with the shaft 21 and meshing with a gear wheel 27 carried by a worm shaft 28, the latter being provided with a worm 29 engaging a worm wheel 30 mounted to rotate on a short shaft 31 supported in a bracket 32 on the side of the vat. 33 indicates a clutch element splined to the shaft 31 and having a clutch face adapted to co-operate with a clutch face on the worm wheel 30, so that when the clutch elements of the worm wheel 30 and the collar 33 are in engagement, the shaft 31 will be rotated.

Within the vat, on the shaft 31, is a gear wheel 34 adapted to mesh with the end one of a series of gear wheels 33, the rotation of the wheels 35 being adapted to effect rotation of certain yarn sticks. The series of yarn sticks is adapted to support a plurality, or field of hanks of yarn, within the vat during the dyeing operation. In the present embodiment a plurality of the sticks is supported in the upper portion of the vat on shoulders 36 extending from the partitions 7 and 8, the plurality of sticks being connected for support to a frame 37 which may be vertically moved into and out of the vat when the cover is open. Above the frame 37 is supported a series

of deflecting plates 38 consisting of inclined cross pieces connected at their opposite ends to longitudinal stringers 39 adapted to removably rest on the tops of the partitions 7 and 8. The purpose of the deflecting plates 38 will be more fully explained hereinafter, it being sufficient to note at this point that when the cover is open and the frame 37 carrying the dye sticks is lifted from the vat, these deflecting plates 38 will be lifted therewith. Furthermore, as the plates 38 merely loosely rest in their position in the vat, they may be removed from the vat independently of the yarn stick supporting frame 37.

A plurality of yarn supporting sticks, 44, is employed in the present embodiment. Each of these sticks is preferably rectangular in cross section and is rotated during the yarn treating operation. To this end one end of the stick enters a squared socket in a rotatable stick support journaled in a bracket carried by the frame 37, the other end of the stick being supported in any suitable manner for rotation in said frame. The gears 35 are provided with a clutch element, these gears being chambered so as to provide a ring having an interior circular clutch overhanging certain other parts.

The axis of each stick is stationarily positioned during the yarn treating operation, the stick nevertheless being capable of rotating on its axis during the yarn treating operation in order to move the hanks of yarn relatively to the respective sticks so that the dye liquor may have access to the portions of the yarn lying against the sticks.

The operation may be briefly described as follows:

The covers are thrown back and the frame 37 carrying the yarn sticks on which the yarn field is supported is lowered into the vat, the frames 37 resting upon the shoulder 36. The frame having the deflecting plates 38 is placed in position opposite the upper face of the yarn field and the cover is closed. The yarn sticks will be slowly rotated so that the parts of the yarn hanks in contact therewith will eventually come in free and unobstructed contact with the dye liquor, and after a proper length of time the operation of dyeing will be completed, whereupon the covers may be thrown back and the frame 37 lifted by any suitable means to carry the hanks of yarn out of the dye liquor, this lifting also carrying the deflecting plates 38 therewith if they have not previously been removed. Should the yarn become entangled, or if for any other reason normal rotative movement of the sticks be resisted, the automatically yieldable power transmitting device, in the present embodiment, the friction clutch connection between the gears 35 and the sticks, will yield, and the gears may continue to rotate under the driving power without further rotative movement of the sticks. The shallow recess co-operating with the tooth of the yoke forms a sufficient frictional connection between the gear 35 and the stick support to cause the support and the stick therein to be effectively rotated during the operation of dyeing, and abnormal resistance to rotation of the stick will cause the tooth to escape from the recess and permit it to remain stationary while the gear 35 continues to rotate under the influence of the power. The dye liquor flows gently upward through the yarn field and has a tendency to uphold the hanks, causing the

light of yarn over the sticks to spread somewhat so that the dye liquor may come into contact with more of the yarn closely adjacent the stick than it would if this expanding were absent. This expanding, however, when the hanks of the field are closely associated, may result in entanglement of one hank with another, so as to obstruct rotation of the sticks, in which case the connection between the sticks and the driving means will yield, the sticks thereafter remaining rotatively at rest though the driving means continues to operate.

### Fractional Distilling Apparatus

(1,407,380; February 21, 1922)

EMILE ANDRE RAYMOND CHENARD, Cognac, Charente, France

This invention has for its object an apparatus for effecting the fractional distillation of most liquid mixtures, whether continuously or not.

The accompanying drawings show by way of example the preferred form of embodiment of the invention.

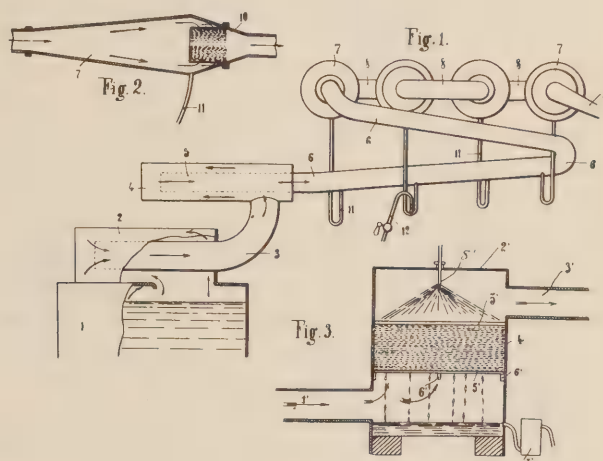


Fig. 1 is a diagrammatic elevation of the complete apparatus.

Fig. 2 is a detail view of one of the units 7 shown in Fig. 1.

Fig. 3 shows the device used for separating tar from the gas obtained from coal, slate, brown coal and peat.

In Fig. 1 the boiler is shown as having the form of a vertical cylinder on the top of which is placed, instead of the usual dome, a chamber 2, the right-hand portion of which communicates with the boiler through an opening formed in the boiler top to receive the vapors flowing out of the boiler and moving upwards into said chamber. On entering the chamber, the vapors travel therethrough from right to left, and enter the open left-hand end of a pipe 3 located centrally of said chamber, through which pipe they flow from left to right, as indicated by the arrows, and finally enter the right-hand end of a second cylindrical chamber 4 disposed above and parallel with chamber 2. The vapors flow through this chamber 4 from right to left, and then enter a centrally arranged pipe 5, through which they flow from left to right. Any number of



units similar to the one just described may be used in accordance with the particular requirements, the whole set constituting an apparatus the purpose of which is hereinafter explained.

The pipe 5 projects beyond the chamber or cylinder 4 and is extended in such a manner as to form a V-shaped conduit 6, the lower branch thereof rising slightly from left to right, while the upper branch has an opposite rise from the right to the left, said conduit conducting the vapors to a series of units 7 such as shown in Fig. 2. Each unit 7 comprises a hollow casing having the form of a pair of cones arranged base to base and the various units are connected together through pipes 8 arranged in staggered relations, the number of units varying in the series in accordance with the particular purpose to be attained. From the last unit of the series the vapors are led through a pipe 9 to the cooling device.

The units 7 shown in longitudinal section in Fig. 2 are given this double cone shape in order to facilitate the spreading out of the current, the vapors being thus permitted to work against the outer pressure throughout the entire zone of increasing cross-sectional area. During this action they undergo internally a progressive cooling which is accompanied by the progressive condensation of the less volatile constituents. Thus is obtained the kinetic and adiabatic separation of the liquid mixture to be distilled, such as a mixture of water and spirit, for instance. This process, which is already described in U. S. Patent No. 1,307,184, granted June 17, 1919, is distinct from the effects obtained in the usual expansion of vapors in thermal engines in so far as it is not connected to an increased volume of the vapors. The volume of the latter, on the contrary, is gradually reduced until they reach the outlet of the apparatus, when they represent in weight and volume only a very small proportion of the original body.

The set of units 7 constitutes therefore a new form of application of the same principle having for its object to intensify the work of the vapors, while reducing the size of the construction, by giving them a greater space for action.

Arranged inside each unit 7 is a cylindrical box 10 provided with large side openings and preferably filled with wire gauze rolled in such a manner as to bring the successive layers of wire gauze very close together, though a packing comprising metal chips, glass balls or porcelain chips may be used for the same purpose. The function of said box is essentially to sift the vapors by providing large screening surfaces, though in the form of a compact construction, upon which the vapors may deposit the liquids resulting from the adiabatic condensation in the front part of each unit, previous to their passing into the next unit. The liquid condensates percolating through the screen boxes are collected in inverted syphon pipes 11 through which they are delivered in the order of their production to the lower branch of the V-shaped conduit 6, where they meet the ascending vapors through said branch

and cool them gradually, thus causing fresh condensation to take place, while they are vaporized gradually through their contact with said vapors.

The stream of liquid condensates runs down by gravity through the parts 5, 4, 3, 2 in a direction opposite to that traversed by the vapors, while exchanging gradually its heat with that of said vapors. Hence the function of the aforesaid arrangement is essentially that of a heat exchanger between the vapors flowing upwards from the boiler and the liquids condensed in the various units 7, and this function will be the better accomplished according as the liquids returning to the boiler have, when the latter is reached, a temperature and a composition which are nearer to the temperature and composition of the liquid in the boiler.

One or more of the return pipes 11 may be provided with an ordinary syphon 12 as shown in Fig. 1, which is controlled by a small cock, this arrangement enabling a partial extraction of the condensates together with the impurities which, in distilling devices, tend to become localized during the course of distillation. An automatic draining of these impurities is thus obtained, which is desirable for the success of the process.

There has been mentioned hereinbefore the use of wire gauze arranged in very close layers for catching the liquid particles entrained in the vapors, and the use of this wire gauze has been indicated as being equivalent to that of any inert materials, as a filtering agent. The separating action is due, in reality, mainly to the fact that the particles of liquid already caught become joined together through a capillary action and form extremely thin liquid screens or films which stretch across the wires and check the flow of gas and the liquid particles carried thereby. Thus it appears that the essential function is not effected by the quite insufficient baffling action afforded by the metal itself, but is chiefly due to the fact that the wire gauze, together with the liquid, enables the formation of the film-like network or screens of liquid; and the efficiency of the device depends mainly upon the two following factors, viz.: the mesh of the wire gauze and the viscosity of the liquid. Moreover, each liquid particle should obtain a very high chance of meeting and being caught by an obstruction. Now the films are continually burst by passing gas or vapor and are not rebuilt at once. Hence, in order to obtain a perfect filtration the obstacles must be multiplied by providing a great number of layers of wire gauze. On the other hand, these webs must be very close together so as to facilitate the formation of liquid films either across the wires of the same web or across the wires of two different webs, this being due to the irregular movements of the gas or vapor resulting from impact against the wires.

Finally, it is absolutely necessary that the mesh and sizes of the wires be such as to avoid the undue resistances which would otherwise be produced, if a packing of wire gauze having too small a mesh were to be used with a very viscous liquid. Experiments have shown

that extremely high resistances might thus be produced which would interfere with the circulation of the aeriform fluid and be prejudicial to the results.

The use of wire gauze may have been disclosed previously, but it has not spread—namely, in connection with distilling purposes—on account of the fact that the theory of the apparatus of the kind described was not sufficiently explained and the efficiency of the apparatus proposed was less than that of the ordinary apparatus. By operating on the principles hereinbefore indicated, on the contrary, it is easy to provide separators which will have the greatest efficiency and may be applied generally to all cases where it is useful to separate, from a gas or a vapor, the liquid carried by said vapor or gas in the form of a mist of variable thickness.

Fig. 3 shows the device proposed for separating the tar from gas obtained from coal, slate, brown coal and peat.

The gas is brought by the pipe 1' to the lower part of a metal box 2' and leaves by the pipe 3' after having passed through the separator. The latter consists of sheets of wire gauze 4' overlying each other and held tightly together by means of two metal plates or frames 5' provided with wide openings and supported by brackets 6'. The tar stopped by the wire gauze agglomerates and trickles down to the bottom of the box from which it is discharged through 7'

In the case of lighting gas, the wire gauze packing should be freely besprinkled with fresh tar before starting and the apparatus is then ready for use.

In the case of coke gas which is to be treated at a higher temperature, whereby the tar is materially less viscous, a greater number of sheets of wire gauze of a finer mesh should be used, the operation of the apparatus being facilitated by a device such as 8', which sprinkles tar on the sheets, thus compensating for the want of viscosity and securing a perfect separation of the tar and the gas.

### Color Identifying Apparatus

(1,408,109; February 28, 1922)

NORMAN MACBETH, New York, N. Y.

This invention concerns an electric illuminating apparatus primarily intended for matching and identifying colors, such as the colors of colored dress goods and the like, by alternately illuminating the same with a source of ordinary artificial light, such as the light given by an ordinary incandescent lamp and with a light source, the color of which has been corrected so that it furnishes a light equivalent to daylight. The apparatus is primarily intended to carry out the method of procedure for the identification of colored objects described in inventor's U. S. Patent 1,239,443 of December 17, 1917.

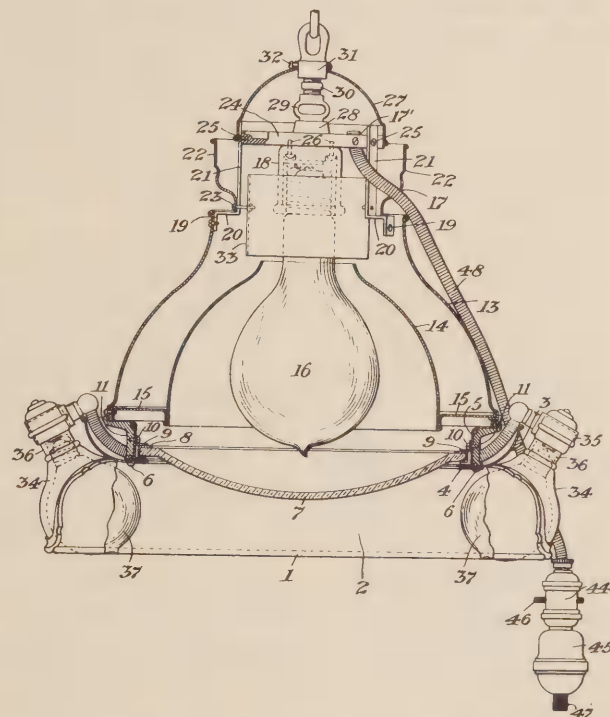
The object is to provide an apparatus of rather large capacity and which may be permanently attached to the ceiling of a room or enclosure in which colored objects are to be examined alternately under an ordinary artificial light and under light equivalent to daylight. In par-

ticular it is adapted to be permanently attached for example to the deck or ceiling of a three-mirror booth such as is used in clothing stores, so that the purchaser of wearing apparel may examine the same alternately under the conditions of artificial light and of daylight, without the necessity of his stepping out of the booth.

Another object is to so construct the apparatus that it is properly ventilated and that the heat generated therein is uniformly distributed and removed.

A further object is to provide means for effectively screening one light source from the other and for preventing light, the color value of which has not been corrected, from escaping outside of the apparatus and thus vitiating the results obtained therewith.

The drawing represents a vertical cross-section of a form of the apparatus suitable for pendant use.



The numeral 1 represents a sheet metal shell, consisting of a lower inwardly-curved portion 2, an upper outwardly-curved portion 3, and a drawn-in middle portion forming a circular ridge. Supported on the said ridge 4 is a cylindrical ring 5 of sheet metal, the lower rim of which is turned inwardly at right angles. Resting on the lower rim of the said cylindrical ring 5 there is a disc 7 of colored glass, chosen with a view of correcting the color value of the light passing therethrough and rendering the same equivalent to daylight. The said disc 7 is provided on its edge with a sheet metal binding 8 and is held in position by angle clips 9 fastened to the inner surface of the cylindrical ring 5 by screws 10. Fastened to the outside of the cylindrical ring 5 are outwardly-projecting lugs 11, to which the rim portion 4 is fastened by screws 6.

At opposite points on the circumference of the above-mentioned lower portion 2 of the shell 1 are cut two openings, covered by reflector casings 34, 34. Each of the said casings is provided with an upper extension 35, 35.



the latter being adapted to receive an incandescent lamp socket of the usual construction 36, 36. Into the sockets 36, 36 there are inserted incandescent lamps 37, 37 of the usual construction, preferably of the refractory filament type.

Upon the above-mentioned lugs 11 there rests a conical shell 13. A reflector 14 is disposed within the said shell 13 and supported from the same by a plurality of inwardly-extending straps 15. Within the reflector 14 there is arranged an incandescent lamp 16, preferably of large candle-power and of the so-called gas-filled type. The lamp 16 is held in a porcelain socket 18 of the usual construction.

At the top of the conical shell 13 and on the inside thereof, there are located a plurality of inwardly-extending straps 19, having a horizontal intermediate portion 20, and an upwardly-extending vertical portion 21. Upon the said horizontal portion 20 there rests an outwardly-curved cylindrical shell 22, fastened thereto by screws 23. The upper end of the vertically-extending portion 21 is fastened to a circular plate 24 by means of screws 25. The above-mentioned porcelain lamp socket 18 is also supported from the under side of the said plate 24 by means of the screws 26.

An inverted cup-shaped top shell 27 fits tightly over the circular plate 24, being supported by the upper end portions 21 of the straps 19. The plate 24 is provided on its upper surface with a boss 28, which has a central threaded opening into which screws a male and female threaded hickey 29. Into the upper threaded portion of the hickey 29 there screws a hollow nipple 30, which is also threaded at its upper end. Onto the latter there is screwed a suspension ring 31, over which the above-mentioned top shell 27 is slipped, whereupon it is fastened to the same by the screw 32.

From the above-mentioned screws 23 there is also supported a cylinder 33 of sheet metal, which is interposed between the neck of the incandescent lamp 16 and the shell portions 13 and 22.

Control of the light is effected by means of closing the main circuit by actuating the two-point switch 44 by means of the push button 46. Operator may thus alternate the incandescent lamp 16, the light of which is corrected so as to furnish light equivalent to daylight, and the ordinary incandescent lamps 37, 37, by operating the three-point switch 45 by means of the push button 47.

Ample space for ventilation is provided, since a large quantity of air can enter through the annular space provided between the upper portion 3 of the bottom shell 1 and the conical shell portion 13. The air thus entering rises in the space between the reflector 14 and the conical shell 13 and partially within the reflector 14. It then passes over the glass disc 7 and around the lamp 16, thus carrying off a considerable amount of the heat generated by the same. The heated air passes out of the top of the apparatus through the annular spaces provided between the shell portions 13 and 22 and the shell portions 22 and 27.

In spite of the large amount of air space thus provided, none of the unfiltered light furnished by the incandescent

lamp 16 can escape to the outside of the apparatus, because it is trapped and reflected towards the interior of the apparatus by the cylindrical sheet metal ring 5 mentioned above, the cylindrical sheet metal ring 33 arranged in the upper portion of the apparatus, and the lower edges of the shell portions 27 and 22.

The interior of the apparatus is easily accessible, because the upper portion thereof can be thrown back by means of a hinge after the lug screw which holds the two sections of the apparatus together, has been loosened.

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## NEWPORT INTRODUCES NEW VAT COLOR

**Product Under Name of Anthrene Jade Green Has Same Characteristics as Other Anthrene Colors, and Produces Very Fast Brilliant Bluish Green**

In placing on the market this vat dye of the anthraquinone series, the Newport Chemical Works, Inc., have added a new and valuable product to their range of vat dyes.

Newport Anthrene Jade Green is marketed as a 20 per cent paste and produces bright green shades of a bluish cast, which are extremely fast to light, washing and chlorine. Combined with Newport Anthrene Yellow G Paste, a range of brightest greens may be obtained, which were heretofore difficult to produce with fast colors.

The color has the distinct advantage over the other Anthrene greens of retaining its full green shade under the action of chloride of lime.

Newport Anthrene Jade Green is also adapted to the dyeing of silk yarns, yielding greens of excellent fastness to washing and light. The product should create considerable interest among the manufacturers of ginghams and shirtings, and is a significant achievement in the production of new fast colors in this country.

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## DU PONT ANNOUNCES NAPHTHANIL SCARLET G BASE

The Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., announces placing on the market Du Pont Naphthanil Scarlet G Base. This product is a valuable addition to the company's line of products which are used coupled with Du Pont Naphthanil AS for the production of shades of extreme fastness on cotton material.

The addition of Du Pont Naphthanil Scarlet G Base permits the production of delicate and attractive shades of pink, from a yellowish to a bluish shade.

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## DU PONT ANNOUNCES PONTACYL LIGHT GREEN SF YELLOWISH

The Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., announces placing on the market Pontacyl Light Green SF Yellowish.

This yellowish shade of Acid Green is well known as a pre-war product, somewhat yellower than the company's Pontacyl Green B previously offered, and having

the advantage over the former product of dyeing exceedingly level.

### G. H. DAVIS AND W. E. SCHOENFELD ESTABLISH ALPHA DYESTUFF CO.

Announcement has been made by George H. Davis and William E. Schoenfeld, the latter formerly of the Newport Chemical Works, Inc., to the effect that they have established their office and fully equipped laboratory under the firm name, Alpha Dyestuff Company, at 155 Broadway, Brooklyn, N. Y. Both enjoy a wide acquaintanceship in the trade, having been connected with Kalle & Co. prior to the war. They will conduct a general dealer business and will do testing for consumers. They announce themselves ready to furnish best quality products and prompt service. The firm's telephones are Stagg, 7143 and 7144.

### JANUARY DYE IMPORTS FIGURES FROM COMMERCE BUREAU

The imports of dyes during January according to the Bureau of Foreign and Domestic Commerce were as follows:

Countries	Alizarin and Alizarine Dyes		Colors or Dyes Not Elsewhere Specified	
	Pounds	Dollars	Pounds	Dollars
Belgium .....	529	1,222	627	397
Czecho-Slovakia ...	...	...	600	1,273
France .....	60	172	661	275
Germany .....	19,326	50,940	245,345	182,347
Italy .....	238	418	8,468	7,911
Netherlands .....	172	565	6,039	8,957
Switzerland .....	...	...	33,430	78,637
England .....	2,096	1,896	17,931	10,469
Quebec and Ontario ...	...	...	160	255
Totals .....	22,421	55,213	313,261	290,521

Countries	Indigo Synthetic		Extracts and Decolorations for Dyeing	
	Pounds	Dollars	Pounds	Dollars
France .....	5,320	13,920	10,590	3,501
Germany .....	...	...	556	1,432
Switzerland .....	19,451	18,008	500	523
England .....	...	...	26,479	1,932
Scotland .....	...	...	27,379	1,730
Jamaica .....	...	...	26,214	6,362
Dominican Republic ...	...	...	35,648	2,707
Haiti .....	...	...	281,787	16,335
Straits Settlements. ...	...	...	2,240	109
Japan .....	...	...	5,364	199
Totals .....	24,775	31,928	416,757	34,830

The Textiloseund Kunstweberei A-G., an artistic weaving establishment in Adorf, Germany, is raising its capital by the issuance of 8,500,000 marks in common stock and 500,000 marks in 6 per cent preferred shares with tenfold vote.

### NEW CAMPBELL BULLETIN DESCRIBES "NEW FAST ACID GREEN"

A new bulletin of John Campbell & Co., 75 Hudson Street, New York, describes the company's New Fast Acid Green, also known as Naphthol Green, which is very fast to light and has enjoyed considerable popularity in the woolen trades.

It is much used as a piece dye for worsteds with silk decorations, as it leaves the latter fiber unstained when dyed by the top chrome method. It is also used as a slub dye applied on a chrome bottom. Its resistance to fulling is satisfactory.

New Fast Acid Green is also fast to alkalis, stoving, carbonizing and light steaming. Silk and cotton threads are both slightly stained when dyed straight "acid," but are left clear when top chromed. This product is useful for dyeing burlaps for wall covering on account of its resistance to light, and is also a serviceable product for the wool and fur felt hat trades because of its ready penetration.

### NATIONAL BULLETIN NO. 20 DESCRIBES SULPHUR BLACK BG CONC.

Due to error, the account in the last issue of The Reporter of new bulletins of the National Aniline & Chemical Company, Bulletin No. 20, which describes National Sulphur Black BG Extra Conc., was omitted. This is another bulletin of the series intended for filing in National's loose-leaf binder, and was issued in conjunction with bulletins describing National Wool Green S National Sulphur Black R, and National Quinoline Yellow.

National Sulphur Black BG Extra Conc. possesses the greenest cast of any of the company's colors of this type. It dissolves readily with half the amount of Sodium Sulphide Conc., which makes it adaptable for the dyeing of raw stock, yarns and piece goods in all types of machines. Its level dyeing quality is rated by the company as excellent, and it exhausts well with common salt.

### DETERMINED TO KEEP OUT GERMAN BROMIDE, SAYS DOW CO. REPRESENTATIVE

"We'll see every pound of American bromide in Hades before we'll let Germany sell bromide in America, said Dr. W. J. Hale, of the Dow Chemical Company, Midland, Mich. Dr. Hale recently addressed the Rochester, N. Y., Section of the American Chemical Society on "Our Chemical Awakening."

Dr. Hale declared that his company is selling at 12 cents a pound bromide that is costing 23½ cents a pound to produce, and is doing this to prevent the Germans from dumping on the American market thousands of tons of the product now in Eastern warehouses. He said that there is to-day \$200,000,000 worth of foreign goods in bond in New York.

Dr. Hale predicted that unless American chemists turn out better products than even her foreign competitors at prices to meet theirs the chemical industries of this country will be destroyed. He argued for tariff protection for American chemicals.



### NOTES OF THE TRADE

With a capital of \$1,000,000, the New York Coal-Tar Products & Chemical Company has been incorporated under the laws of New York State. Incorporators are the Corporation Guarantee & Trust Company, Land Title Building, Philadelphia, Pa.

"Colors Fast or Fading" is the title of a bulletin just issued by the Atlas Electric Devices Company, of Chicago. It tells of the value of the Fadeometer to industries making or using colored materials.

The Grant Chemical Company, Newark, N. J., has been incorporated with a capital of \$25,000. The incorporators are Nathan Gelb, William M. and Lovett A. Grant, 790 Broad Street, Newark.

The Anke Knitting Mill, of Hawley, Pa., will erect an addition to their plant to increase production. They recently erected a new mill in White Mills, Pa., which is now in full operation. The products are men's, women's and children's sweater coats, golf stockings, bathing suits, caps and leggings, for the manufacture of which additional new machinery will be installed in the Hawley mill.

The Jersey Silk Dyeing & Finishing Company, Paterson, N. J., has taken over the Beltramo Piece Dyeing & Finishing Company, under the active management of Dr. John H. Haerry as vice-president and general manager. Their specialties are jersey cloth, satins, crepes, artificial silk and mixed goods.

The Robertson Chemical Company, Norfolk, Va., is planning for the rebuilding of the portion of its plant, recently destroyed by fire, with loss estimated at about \$40,000. Headquarters are in the Board of Trade Building. Walter H. Robertson is president.

The Thomas Textile Company, New York, N. Y., has been incorporated, with a capital of \$1,000, for the manufacture of textiles.

The Lima Woolen Mills, Lima, Ohio, has been incorporated, with a capital of \$200,000, for the manufacture of all-wool blankets. J. A. and J. N. Claypoole are the managers of the new concern. An initial equipment of thirty looms will be installed when the new mill construction is completed.

The Republic Chemical Company, Manitowoc, Wis., is planning for the installation of machinery in a new local plant. E. H. Koehneke is president.

Artificial silk is being used in such large and increasing volume in the manufacture of broad silks and ribbons that from now on it will have to be reckoned with as a very important element in the fabrication of

natural silk goods. It is believed that the statistical position of artificial silk to-day is so important that the Silk Association of America may call attention to its position in the industry in its fiftieth annual report.

A. W. Van Ness and C. M. Guy, of New York City, and John G. Snyder, of Philmont, N. Y., are among the incorporators of the Columbine Garment Company, incorporated with a capital of \$25,000 for the manufacture of hosiery and underwear in Philmont.

The Sylvade Silk Mills, 126 Market Street, Paterson, N. J., have been incorporated with a capital of \$125,000. The incorporators are Charles Turndorf, Sophie Charney and Cora De Mol.

The Southern Dyestuffs Company, Nitro, W. Va., recently organized, will soon commence the installation of considerable equipment in five of the buildings of the former Government works, recently acquired. The complete plant production will total 160 intermediates for dyestuffs. Employment will be given to about 200 operatives.

The Industrial Dyestuff Company, East Providence, R. I., has been incorporated, with a capital of \$50,000, to manufacture dyestuffs, chemicals, etc. The incorporators are Herbert L. Tobey, Simon Norman and John H. Caton, Jr., 96 Arnold Avenue, Edgewood, R. I.

The San Silk Company is the name of a new co-operative concern recently organized by nineteen Polish-American citizens at Paterson, N. J. The capitalization is \$100,000 and the four principal shareholders are Charles Guernsey, 59 East Main Street, S. Sasowskim, A. Walzak and A. Andrejeswki.

The Marble Mills, Inc., of Evanston, Ill., have incorporated, with a capital of \$50,000, for the manufacture of woolen piece goods, at the northeast corner of Benson Avenue and University Place. The incorporators are: Edward M. Marble, of Winnetka; Eugene C. Marble, also of Winnetka, and Sol. H. Shoninger, of Chicago.

The Silk Association of America, the National Association of Woolen and Worsted Manufacturers and the National Association of Finishers of Cotton Fabrics have, by resolution, commended the work of the Textile Alliance, and favor the continuance of its service through some non-profit retaining organization of the consuming trades. George A. Post, a vice-president of the Silk Association, represents the silk industry as one of a committee of three from the above industries, appointed to study the present situation and work on the question of the further distribution of German dyestuffs.

TEXTILES

PAPER

LEATHER

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

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NUMBER 8

## FEATURES OF THIS ISSUE

In "The Dyeing of Shoddy Materials,"  
Leon W. Sidebottom discusses various  
methods employed and special precau-  
tions necessary in this class of work.

The concluding instalment of "The Piece  
Dyeing of Ladies' Dress Goods and  
Coatings with Acid Colors" deals with  
various effects, stripping, redyeing, etc.

Part III of "The Microscope: An Impor-  
tant Industrial Instrument in Analysis,  
Testing and Manufacture" describes  
the use of this device.

Proceedings of the A. A. T. C. C. are omi-  
ted from this issue owing to lack of  
material (see note, page 273).

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## The Dyeing of Shoddy Materials

Characteristics of Shoddy—Dyeing as Raw Stock—Control of Results—Stripping—the Hydrosulphite Strip—Suitable Dyestuffs—Dyeing in the Piece—Special Care Required with Cotton Mixtures—Speck Dyeing in the Washer

By LEON W. SIDEBOTTOM

*Essex Aniline Works*

**S**HODDY or reclaimed wool is the material obtained from reworking woolen and worsted tailor's clippings, rags and waste material from various branches of the woolen and worsted industry. While naturally inferior to its original form, it is possible for a good grade of shoddy to be superior to a fabric made from virgin wool. However, the fact that cloth made from shoddy is seldom all wool and usually contains a large amount of cotton intentionally added, either in the form of a cotton warp, or carded directly with the shoddy raw stock, makes the finished fabric a much inferior product.

Shoddy is usually dyed as raw stock or in the piece, depending entirely on the pattern of the finished fabric. If for stripes, checks and fancy goods, it must be dyed as raw stock; but if for solid shades, piece dyeing is more economical.

### DYEING RAW STOCK

When the material is to be dyed as raw stock, the clippings or rags should be sorted into lots, each lot being made up of rags approximating the same shade as nearly as possible. In some cases this will eliminate the dyeing process entirely, as the rags, after carding and spinning, will have given the desired shade of yarn. This is often the case with blues, browns and blacks.

If the finished fabric is to be all wool, the material must be carbonized to destroy all cotton threads which may come through, as stitching and so forth. This step is not necessary if the fabric is to contain cotton, as subsequent dyeing will cover any cotton coming through with the rags.

The material is now passed through the pickers which break the cloth down to the single fibers as nearly as possible. This is not quite complete, and the stock as it comes to the dyehouse is a tangled mass of fiber, thread and even small bits of cloth.

The dyeing follows the picking. Stripping is to be

avoided if possible, as the stock is given a considerably harsher feeling. Without stripping we may obtain on red stock, a deeper red, browns, bordeaux, olive brown, or black. On brown stock it is possible to obtain a darker brown, olives, reddish brown, or black. On blue stock, darker blues, navys, all shades of green, browns and blacks are possible. Green will permit darker greens, olives, browns and blacks. Any darker color may be dyed on gray, but black must be stripped for any color other than black. The brightest shades are obtained by the use of acid colors, but if fulling fastness is desired, the chrome bottom, afterchrome, or, in some cases, direct cotton colors must be used.

### STRIPPING

Should stripping be necessary, one or more of the following methods may be used:

1. Boiling with Glauber's Salt.
2. Boiling with Ammonium Hydroxide.
3. Boiling with Soda Ash.
4. Sodium Bichromate and Sulphuric Acid.
5. Hydrosulphite.

On material which has been dyed with acid colors, boiling with 10 to 20 per cent of Glauber's Salt will often strip the stock appreciably. The boiling should not be continued longer than one-half to three-quarters of an hour, as the dyestuff will tend to attach itself to the fiber again.

Boiling with 1 to 2 per cent Ammonium Hydroxide is more effective than the Glauber's Salt boil and will strip most of the acid colors very readily.

Boiling with 1 to 2 per cent of Soda Ash for one-half hour is recommended if the material is to be dyed a shade fast to fulling. The Soda Ash will strip any colors which might bleed in the later operations.

To strip with Sodium Bichromate and Sulphuric Acid,



the bath is made up with 4 to 7 per cent Chrome and 6 to 10 per cent Sulphuric, with or without the addition of 4 to 7 per cent of Oxalic Acid. The material is run for one hour at the boil. This method leaves a yellow bottom of Oxide of Chromium on the fiber, which acts as a mordant for any Chrome colors which may be used in redeyeing.

#### THE HYDROSULPHITE STRIP

The hydrosulphite strip is perhaps the most desirable, as it leaves an exceptionally clean fiber with very little harsh feeling. The material is worked at 100 to 120 deg. Fahr. in a bath made up of 2 to 4 per cent of a formaldehyde hydrosulphite and 1 to 2 per cent formic acid.

Raise to a boil in one-half hour and boil one-half hour. Wash well. In place of the hydrosulphite mentioned above we may use a hydrosulphite made up from Zinc Dust and Bisulphate of Soda. This will not keep long without decomposition and should not be made up in greater quantities than is necessary for immediate use. Convenient proportions of these chemicals are as follows: 14 gals. of 52 deg. Tw. Bisulphite of Soda are diluted to 50 gals. with water. 15 lbs. of Zinc Dust are then shaken in gradually with continual stirring, the temperature being kept as low as possible to prevent decomposition. The mixture should then be stirred for an hour and allowed to settle. The clear liquid is then ready for use, enough being taken to obtain the desired stripping action. The Formic Acid should be omitted when using this Hydrosulphite. Thorough washing must follow any of these methods of stripping.

#### SUITABLE DYESTUFFS

For the dyeing, in the raw state, we may use the direct cotton colors, acid colors, chrome bottom or afterchrome colors, and occasionally a few basic colors. The dyeing is usually conducted in open kettles, the material being agitated by poling. The direct cotton colors, although not extremely bright, yield dyeings of good light and fulling fastness. They are dyed with the addition of Glauber's salt and exhausted with Acetic Acid. The acid colors yield bright shades but are not usually fast enough to fulling for general use. They are dyed with Glauber's salt and exhausted with either Acetic or Sulphuric Acid. The true insoluble alizarine colors, or chrome bottom colors, are seldom used (unless the stock has been stripped with chrome and sulphuric acid) as they require two baths and lengthen the process considerably.

The afterchrome colors find the most favor, as they do away with the necessity of two baths. They are dyed in an acetic acid bath with or without the addition of Glauber's salt and exhausted with sulphuric acid. The chroming takes place in the same bath and any further addition of dyestuff for shading may be added after the dye bath has been cooled to about 160 deg. Fahr. No further chroming is necessary. Basic colors, with the

exception of Victoria Blue, find little use in shoddy dyeing. Where extreme brightness is required, with little or no fastness, they find occasional use for the top-ping of dull shades. They should be applied in a strong acetic acid bath with no other addition. The nature of the stock causes the dyed material to look very uneven, but the subsequent carding and spinning will equalize any unevenness caused either by faulty dyeing or different colors in the stock.

#### PIECE DYEING OF SHODDY

By far the greater amount of shoddy dyeing is conducted in the piece. It may be necessary to strip, in which case the same methods are followed as mentioned in connection with raw stock. Bright brilliant shades are seldom available, due to the nature of the material, and usually run to tans, browns, dark reds, navy blues, dark greens and blacks. If the cloth is all wool, these are easily obtainable with the use of chrome top or chrome bottom colors. When the shoddy filling has been woven into a white cotton warp, however, we must resort to the direct cotton colors. The warp must be dyed slightly heavier and duller than the shoddy filling, otherwise the warp will appear thin and "hungry." This is accomplished by mixtures of neutral dyeing acid colors and direct cotton colors. The method of dyeing the piece will vary considerably with the nature of the fabric. Heavy goods, with the filling napped up heavily to cover the cotton warp, will require a considerable amount of Glauber's salt and slow treatment. The necessary amount of color, previously dissolved, and 20 to 30 per cent Glauber's salt, is added to the cold dye bath, and the goods allowed to run until thoroughly penetrated. The addition of a little soluble oil at this time will also aid the penetration. If the material is very heavy, running with 20 per cent of Glauber's salt, before the addition of the dyestuff, is recommended. The temperature of the bath is then gradually raised to a boil and boiled until the wool comes to shade. If, after boiling, the cotton is found to be weak, more of the direct cotton color is added and the goods run in the cooling bath. On lighter fabrics, with the cotton warp showing plainly, both warp and filling must be brought more closely to the same shade, although it is still good practice to have the cotton slightly heavier and duller. They do not need the long preliminary treatment, as the cotton will cover readily. The usual procedure is to start the dyeing at room temperature, raise to a boil in one-half hour and boil the wool to shade.

#### PRESENCE OF COTTON REQUIRES SPECIAL HANDLING

When a considerable amount of cotton has been carded and spun with the wool into filling, especial care must be taken not to have the results specky. It is advisable to choose a mixture of dyestuffs so that the desired shade is obtained with the least possible amount of boiling. To illustrate with a dark green; the formula might read as follows:

For 100 lbs. of material, dye with

1 lb. 8 oz. Diazine Black.  
 7½ oz. Stilbene Yellow.  
 1 lb. 4 oz. Naphthol Blue Black.  
 30 lb. Glauber's salt.

Raise to a boil in one-half hour and boil twenty minutes. The Diazine Black and Stilbene Yellow will dye the cotton a dull green and as neither dye the wool, the cotton is readily brought to shade in the slowly heating dye bath. At the boil the Blue Black and Azo Yellow will bring the wool to the proper shade without detracting from the strength of the cotton. If, instead, a direct green and direct black had been used, continued boiling, necessary to bring the wool to shade, would have caused the cotton to look thin and specky.

A still better practice in connection with union shoddy work, although more expensive, is to dye the cotton warps first with sulphur colors, somewhat heavier and duller than the shade to be matched in the piece. Then, after weaving this dyed warp with the shoddy filling, we may use the faster afterchrome colors to dye the wool.

#### SPECK DYEING IN THE WASHER

Still another possibility is speck dyeing in the washer. If the rags have been sorted, garnetted and spun into the desired color, dyeing of the stock is unnecessary. The

goods from the loom are napped, fulled, washed and are then ready for specking. Direct cotton colors are selected which will approximate the same color as the wool. If a green is desired, use Diazine Black and Stilbene Yellow; for a brown, a mixture of Stilbene Orange and Diazine Black; for a blue, use Diazine Black alone. Benzo Purpurine may be used for red, but care must be taken to use as low a temperature as possible or the wool will become stained. For black, a typical example would be as follows: The washer load is made up of sixteen pieces of forty-five yards each, weighing eight ounces to the yard. Material is 60 per cent white cotton. Eight pounds of direct black and one pound of Soda Ash are dissolved in fifty gallons of water and run into the washer at 120 deg. Fahr. Twenty-five pounds of Common Salt are then added and material run one-half an hour and rinsed. The cotton will be well covered and will possess much better light fastness than the much used logwood black speck dye.

In conclusion, it must be remembered, that reworked wool has greater affinity for dyestuffs than virgin wool, due to the fact that the material may have been carbonized, or that chrome, or similar metallic salts, may have been used for the production of the original shade. Also, it is well to bear in mind, in connection with union shoddy dyeing, that all direct cotton colors stain wool but slightly at low temperatures, or with the addition of a slight amount of Soda, but at boiling temperatures even the Stilbene Yellows and Oranges will stain to a slight degree.

## The Piece Dyeing of Ladies' Dress Goods and and Coatings with Acid Colors

### Part II

General Consideration of the Dyeing Process—Various Methods—Dyeing of Light-Weight Fabrics—Dyeing of Ladies' Coatings—Cotton Warp-Worsted Filling Effects—Shading—Stripping—Repairs and Redyes

By B. T. C.

(Concluded from page 220.)

#### GENERAL CONSIDERATION OF THE DYEING PROCESS

**A**CID colors dissolve quite readily in boiling water. There are three general ways in which dyestuffs may be dissolved, each of which has its advantages and disadvantages.

One method is to boil up the color in pails and, after sieving to keep back all foreign matter and undissolved dyestuff, to add direct to the kettle. Cold water is admitted until the steam pipes are covered, the steam turned on and everything boiled for ten to fifteen minutes. As a rule the kettle is then cooled down by adding water and the pieces thrown in. In rare instances this boiling up takes place during the afternoon before the dyeing is to take place, and the liquid allowed to cool overnight. Such practice is rather dangerous, due to leakage, and certainly is not to be recommended.

A second method is placing all dyestuff in a finely meshed cotton bag and tying the ends with a suitable length of rope. The kettlemen simply swish the bags of color back and forth in the dye kettle, using a lukewarm bath, until all the color is dissolved.

Generally, however, the color is boiled up with a sufficient quantity of water, and then the solution is strained through a finely meshed copper sieve. Naturally more water is needed for full shades than for light shades, due to the wide difference in the amounts of dyestuff.

Before adding any color or chemicals it is well to look over the kettle rather closely. It should be seen that the plugs are absolutely free from lint, threads or woolen waste, or else there is always the chance of part of the dye bath leaking out. When leakage occurs it means not only a loss of dollars and cents to the mill but more trou-



ble for the dyer in bringing the bath up to shade. Enough water should be added, because too short a bath means cloudy results in the dyed pieces. There is hardly any need to mention here the danger of overcrowding the kettles. When the foreman is absolutely certain that everything in the kettle is as it should be, he should order the men to add the requisite amount of Glauber's salt. At this point it is often advisable to heat the bath to 110 deg. Fahr., or until the salt is dissolved. The color may now be added. Care should be taken that the solution is not too concentrated and that none of the color is spilled on the pieces. This is especially important if the carbonized goods have not previously been neutralized with ammonia. When all the color has been added, the vitriol, or whatever acid is being used, may be poured into the bath. Under no circumstances allow any of this acid, which is more or less concentrated, to spatter on the goods. Such carelessness is the cause of shaded and cloudy pieces.

After all dyestuff and chemicals have been added, allow the pieces to run ten minutes before turning on the steam. This allows the liquor to penetrate well into the fabric. Then turn on the steam and raise the temperature gradually to the boil in one hour for light and medium shades and in one hour and a quarter for such full shades as navy, dark brown, dark green, etc. Care should be taken that the steam issues uniformly from each outlet, as uneven steam distribution is apt to cause trouble. It is also well to keep the apertures of the steam pipes free from tufts of loose wool. All dyers are more or less familiar with such instances as having six pieces of an eight-piece batch dyed perfectly and the other two pieces rejected. Uneven distribution of steam has much to do with such results.

After the kettle has come to the boiling point, allow it to boil strongly for half an hour. At the end of that time turn off the steam and sample, being sure that the operator doesn't turn on the steam until a color addition has been made or until given orders to do so. The small samples are generally dried between a folded cotton cloth wrapped around a steam pipe, and after being cooled are brought to the dyer. This last point is very important, as the shade often changes appreciably as the samples are cooled. For instance, a red always tends to go bluer on cooling. When it is necessary to make an addition to bring the batch up to standard, filter the color, as at the start of the operation, and add the liquor carefully, being certain, first, that none of the color strikes the hot pieces, and, second, that the solution is distributed evenly throughout the kettle. When all has been added allow the kettle to run five minutes without steam—ten is better—and then raise to the boil and boil for one-half hour before sampling again. For light shades, twenty minutes' boiling after making an addition is sufficient. When the batch is up to shade, continue the boiling. Blacks, as a rule, are boiled one hour, sampled, and if up to standard are boiled another quarter of an hour, after which they are washed. Navy shades are boiled one hour and a half

to two hours, depending upon the quality of the goods. With other shades, however, it is advisable, after boiling the required length of time, to turn off the steam and allow the pieces to run through the cooling bath for another half-hour. By taking this precaution the bath is cooled perceptibly and there is less danger of streaky goods due to faulty rinsing. However, it should be remembered that the shades go darker on cooling and that this fact must be allowed for by the dyer.

Washing off after dyeing is quite as important for securing good results as is the use of proper dyestuffs and acid. If the kettles are equipped with warm-water pipes, wash with this until the bath is lukewarm. Then turn on the cold water and continue rinsing until the bath is clear. If cold water alone is used for this operation, care should be taken that the water does not strike the pieces directly and that it is equally distributed throughout the kettle. Some mills have lengths of hose which may be stretched from kettle to kettle as needed. In any case, never remove pieces until they are absolutely cold. This naturally means that on the average the rinsing will take a longer time in summer than in winter.

After the goods are removed from the kettles they are either extracted while in the rope form or, better still, opened full width and then sent to the centrifugal. After this the goods are sent the finishing department.

#### THE DYEING OF LIGHT-WEIGHT FABRICS

Under this heading come such fabrics as serges, tricotines, gabardines, Veréjans, Poiré twills, poplins, stockinettes, crepes, etc. Tacking is the first consideration. If the particular style in question tends to form mill wrinkles during the dyeing operation, it is well to tack before sending the pieces to the kettles. By tacking we accomplish a change of fold; that is, the pieces do not tend to run over the winch in the same creases or folds, but, due to the air pocket formed, vary continuously.

The time required for bringing to a boil, etc., has been described at length in a preceding paragraph.

Worsted crepes are treated somewhat differently. Due to the fact that they are often made from very tightly twisted yarns which are used both in the warp and filling, the dyer has to watch this type very carefully. This is especially true if the fabric has been carbonized in the piece, since complete neutralization with ammonia is rendered difficult because of the tight twist. As a rule, the temperature of the neutralizing bath is raised to 130 deg. Fahr. or even 140 deg. Fahr. Some dyers go so far as to raise to a boil, but the wisdom of such a policy is doubtful. Dye according to the method given, although the use of acetic acid and subsequent exhaustion with sodium bisulphate is to be recommended in place of sulphuric acid. At times it is even necessary to add but half the color and all the acetic acid at the start of the operation, raise the temperature to 150 deg. Fahr. in half an hour, and, after turning off the steam, to add the second portion of color. Allow the pieces to run ten minutes with-

*(Continued on page 278.)*

# The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture

## Part III.

(Continued from page 188.)

By A. K. JOHNSON, S.B.

Lowell Textile School

Using the Microscope—Factors Affecting Results—Cleanliness—Thickness of Coverglass and Tube Lengths—Influence of Mounting Medium—Preliminary Treatment of Object and Care in Preparation of Mount—Illumination—Care of the Eyes—Posture

### USING THE MICROSCOPE

OPERATING the "delicate" microscope appears to be a tedious and confusing task to the uninitiated. Such, however, is not the case in a large majority of uses. The operations for use in average work are easily done, the danger to the instrument is very slight when a few common-sense precautions are observed, and the feeling of confusion experienced in the preliminary work is relieved very shortly by a systematic method of procedure. A reasonable time spent in studying and in practising the principles of operation, and in observing the more common factors affecting the results, will give an understanding of the instrument and its use which will instill confidence and arouse an interest for further work.

Using the microscope as an instrument is dependent upon four operations, namely, (1) placing the object in proper position, (2) illuminating the object so that the light will come from it into the microscope, (3) focussing the microscope so that it will be at the correct distance from the object to give a sharp image, (4) controlling the magnification for the particular problem at hand, or manipulating other devices for special study.

In the case of simple microscopes these operations are very easily carried out. The position of the object is of little account so long as it is reasonably flat and is in good light; it may be located on a table top, on a glass plate or held in the hand or by a stand, depending upon its nature.

The quantity of light required is not large and the supplying of it not at all difficult. Simple microscopes are usually of a single, low magnifying power so that little choice is offered or needed for the kinds of work to which they are adapted. In case of focussing there is usually some demand put upon the operator to adjust the distances of the microscope from the object. This is accomplished by holding the instrument near to the eye and moving it toward or away from the object until a clear image is seen. Manipulating the simple microscope is so very easy as to seem almost like second nature.

With compound microscopes the problem of fulfilling the conditions necessary to give good microscopic

vision are more exacting. This is increasingly true as the power of magnification becomes greater and greater. There is more and more need for a thinner, flatter object more carefully treated in preparing it for examination. The free distance between objective and object becomes more minute, and the distances of movement of the instrument finer. The area visible becomes less (see Table 2) and the details shown more

TABLE 2

*Showing magnifying powers of objectives and oculars alone and when combined. Also gives, in mm., the diameter of field when instrument is in focus (from Bausch & Lomb Company catalogue.)*

Table of Magnifications and Real Fields

Tube length = 160 mm. Projection distance = 250 mm.

Objectives		Eyepieces				
E. P. In millimeters	Initial Magnification	5X	6.4X	7.5X	10X	12.5X
43	2	10X 10.5 mm	13X 9.0 mm	15X 8.5 mm	20X 8.5 mm	25X 6.8 mm
32	4	20X 5.5 mm	26X 4.8 mm	30X 4.3 mm	40X 4.4 mm	50X 3.5 mm
16	10	50X 2.10 mm	64X 1.85 mm	75X 1.70 mm	100X 1.74 mm	125X 1.38 mm
8	20	100X 1.02 mm	130X 0.90 mm	150X 0.83 mm	200X 0.85 mm	260X 0.67 mm
4	43	215X 0.48 mm	275X 0.43 mm	320X 0.39 mm	430X 0.40 mm	500X 0.32 mm
3	57	285X 0.36 mm	365X 0.32 mm	420X 0.29 mm	570X 0.30 mm	740X 0.24 mm
1.9	95	475X 0.22 mm	610X 0.19 mm	720X 0.17 mm	950X 0.18 mm	1260X 0.14 mm

and more unlike that of every day visual use. In addition to these is the need for using the lighting accessories. All of these conditions give the novice a sense of strain in using the instrument and make it a little difficult at first for him "to see anything." By beginning with the lowest magnifications where conditions are easiest, encouraging familiarity with the instrument is readily acquired. Use of higher powers is then more easily made. To use the compound microscope, the properly prepared object is placed upon the center of the stage over the opening and under the objective. The lighting devices (mirrors, condensers) are arranged to throw light upon the object, and, with the eye held at the level of the stage, the microscope is lowered by the course adjustment until the objective almost touches the cover glass. The eye is then changed to a position over and near to the ocular, and



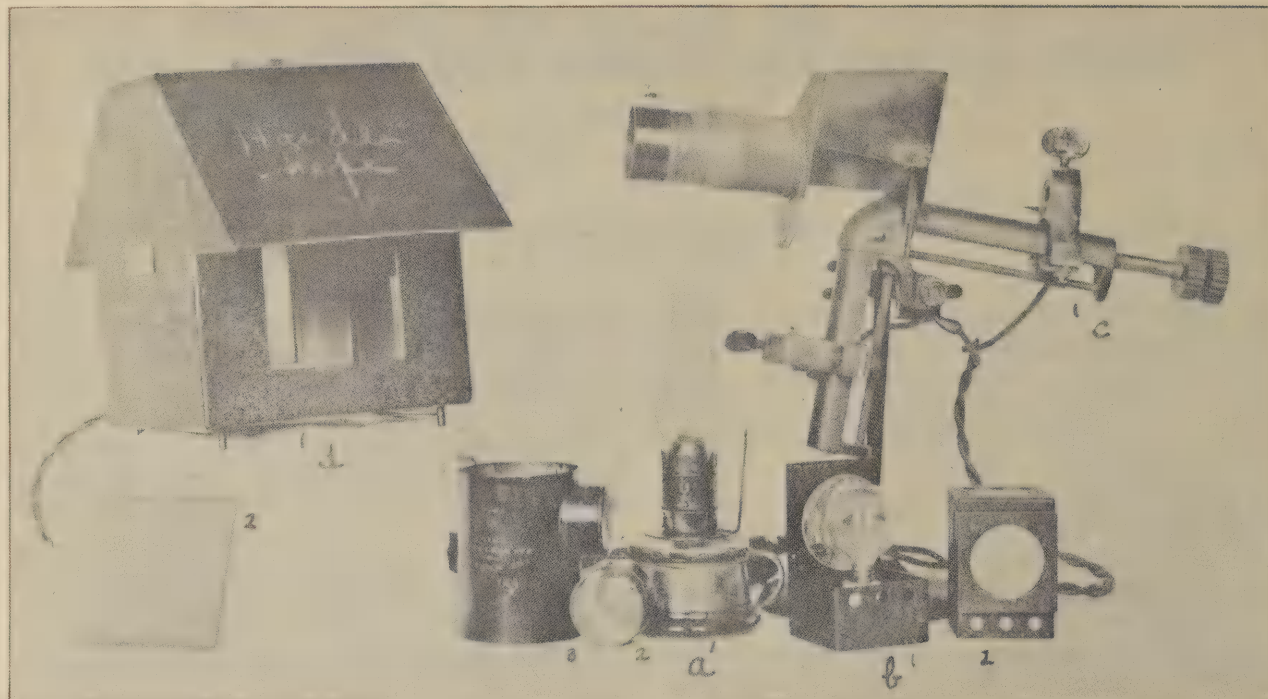


FIG. XI—Some Artificial Sources of Light for Illumination

a—(1) A small oil, wick lamp with support for (3) a hood provided with a bull's-eye lens. The blue glass (2) fits over this lens and helps to correct for excess yellow in the flame.

b—(1) An individual electric lamp with reflector and with base over which fits (2) a hood provided with a disk of ground glass for diffusion of the filament light and with a disk of blue glass for color correction. This light may be so placed as to shine into the mirror of the microscope, or this mirror may be pushed aside and the lamp placed between the legs of the base so that its light shines directly upward to the stage opening.

c—(1) A hand, carbon arc lamp on a stand. This lamp is of

good service for lighting with a vertical illuminator or for giving reflected light from the object. The light rays are focussed by a lens in (2). A blue glass is also inserted into (2). It is well to remember that the heat rays are also focussed by this lens, and therefore the arc lamp should be used only when this condition is *not* harmful.

d—(1) is an electric lamp house provided with two diffusion blue glasses. One of these glasses (2) is removed. Through the opening in the house into which (2) fits is seen the other blue glass. This lamp house will illuminate four microscopes of once.

the microscope raised until a clear image is given. This procedure prevents the danger of violent contact of the objective with the cover glass with probable damage to either or both. It is one of the common-sense precautions. Final adjustments of the position of the object, the illumination, and the focus may then be made and the study begun.

#### SOME FACTORS AFFECTING RESULTS

##### (a) Cleanliness

Cleanliness of all optical parts, glass surfaces, instruments and reagents, is a very important condition to meet in getting clear and satisfactory images. Smears and films upon the surfaces of the objectives and oculars is highly detrimental, making it impossible to obtain distinct images. These smears usually come from contact with the fingers or from immersion in fluid used upon the object. Dust easily penetrates be-

tween the lenses of the ocular and upon the back lens of the objective. Such particles appear in the image and are very liable to be confused with the object being studied. It is a good practice to examine all optical surfaces and remove all smears and dust with a soft, lint and grit free cloth or time paper before starting to use the instrument. Very small objects are usually placed upon glass strips, or slides, for examination, immersed in a suitable liquid or solid medium, and covered with a thin glass (0.18 mm. thick, a so-called cover glass). These glass slides and cover glasses give best results when perfectly clean. The mounting medium should have as little suspended sediment as possible. Strict attention to the cleanliness of these things gives much comfort and satisfaction in obtaining sharp images, in eliminating undesired and confusing foreign images, and in reducing false interpretations of what is seen.

(Continued on page 280.)

# Technical and Practical Faults in Wool Dyeing

Being the Report of a Discussion Conducted at the December 9 Meeting of the Huddersfield Section, Society of Dyers and Colourists, and Continued at the January 13 Meeting. Published in the Journal of the Society

(See note, page 273, under heading, "Proceedings of the A. A. T. C. C.")

## DECEMBER MEETING

**E**DMUND STAPLETON, who opened the discussion, said that one of the greatest problems facing the dyer to-day was the question of listed pieces. Twenty to thirty years ago this was unknown, simply because it was not looked for. If the required shades were produced, that was all that was necessary. The comparison of the list and the middle of the piece was not done then, even by the best perchers. A blotched or clouded piece did not come under the heading of a listed piece. This fault was caused as a rule by soap being left in the piece, but sometimes the dyer was apt to be rather hard on the scourer, though the scourer was partly to blame in many cases. Certain oils and various compounds of size were used in worsted cloth, which were difficult to dislodge in the scouring, especially in the harder cloths.

In some cases listing might be a mechanical defect. Goods such as Venetians and satin-faced cloths sometimes showed slackness at the sides and the ends, causing a big difference from the middle in the matter of shade. In dark shades this might not be so pronounced as it was in a fawn or light brown, where it was very marked. Again, in pieces of one quality, they would invariably find the milled goods darker in shade than the plain goods.

There were also pieces which rolled up at one or both sides through neglect in the weaving shed. Some years ago he had a large number of pieces of this description. They asked the customer concerned to come and see the goods, and he at once took up the matter and remedied the fault. Since that time they had never had to bag or sew a piece from that firm.

There were ways in which listed and flecked pieces could be caused in the dyehouse—namely, (1) by entering goods into the liquor too hot; (2) by getting up to the boiling point too soon; (3) by not boiling thoroughly either in chroming or dyeing, thereby taking a risk of the washing producing an uneven color. Each man had his own methods of working and consequently it would be a help to them all if they could compare notes with regard to these faults.

In reply to J. F. Copley, Mr. Stapleton defined a listed piece as one in which the shade at the selvedge was different from that in the middle of the piece, either lighter or darker.

Arthur Mallinson said that from some firms they got

pieces which curled or bagged, and from other firms the pieces gave no trouble. What was the cause of this defect? The cloths in question were Venetians.

Mr. Stapleton said it was caused by bad weaving, or by a tight warp.

The Chairman (Dr. Paul) asked if there was anything in connection with washing out the size which might cause trouble.

Mr. Stapleton said the trouble was that they did not know what had been done with the piece. They always assumed that the size had been removed, but it seemed to be a frequent cause of trouble. When milling was done, the defect was sometimes a mechanical one, through some portions of the piece being more milled than others.

H. E. Wood asked what class of goods was usually subject to listed faults, and Mr. Stapleton said it was generally the harder twists. There was seldom any trouble with soft goods, but at the present time the tendency was to make **harder twists**.

J. Morton said they had found a great deal of difficulty with hard twists, and he considered that it was often caused in the preparing of the pieces. They had consequently gone thoroughly into the preparing processes, the crabbing, blowing, milling, and scouring, and had made a very great diminution in listedness. The only way to eliminate it was to exercise very great care and supervision over the preparing processes. With regard to bagging, he had had four pieces recently of a very low serge, to be dyed light fawn. The first run had been unsatisfactory, and he had done them again, but still they were **listed—red at one edge and green at the other**. The third time he had bagged the pieces, and they came up **perfectly level**.

Mr. Stapleton said he quite agreed with Mr. Morton with regard to the preparing and scouring processes. With regard to crabbing, they had had a case in which the wrapper had been used until it was colored, and the color had gone on to the piece at the list, where the steam came out.

Mr. Morton said that some years ago, in doing some very wide goods—60 inches wide—they had traced the trouble to the fact that after crabbing, the goods were left to stand **overnight on a horse**, and the pressure in the middle of the piece squeezed the liquid out to the edges. The goods were steamed the following day, which consequently **set the fault**.

Dr. Paul said that he thought the benefits of using



ammonia were very much exaggerated. If it was a question of soap being left in the piece, he did not see how ammonia would help.

Mr. Stapleton said that some men preferred to leave a little soap in to improve the feel; but he preferred to have it all out.

A. Gaunt said that pieces boiled up with ammonia would lather more freely.

Dr. Paul said that even weak ammonia would dissolve wool completely, consequently he would not care to boil wool in water containing ammonia.

Mr. Copley said that some years ago, when there was a drought, some local manufacturers had used for scouring purposes the water obtained by his firm from bore wells. The water was slightly alkaline, and they had found that when they rinsed off the soap there was no lime soap formed, while when the goods were in the stocks the lather would form again without any soap being added. That experience certainly seemed to show that with water on the alkaline side the soap would be more soluble and more easily rinsed out.

R. F. Whalley said that a dyer did not often get a manufacturer to admit his fault, but when the manufacturer was his own dyer that would be done, and a friend of his who was in that position considered the chief cause of listed pieces to be faults in manufacture. If the warps were not beamed and woven properly the piece was slacker on the list than in the middle, and the dye was taken up more on the list than in the middle. His friend was so keen on the point that he would not have any warps made for him, and said he had removed all liability of listed pieces.

J. Hollingworth said that in a listed piece the fault was usually regular from one end of the piece to the other, which seemed to prove that it was not caused by the dyeing machine, where the cloth was running in rope form. There were probably half a dozen different causes, some due to manufacture and some to scouring and finishing. One of the chief was the crabbing and blowing process. If the pieces were not crabbed and blown thoroughly, they would certainly be faulty, either listed or cloudy. A curled piece could always be dyed satisfactorily by having it bagged, and the only way to correct a listed piece was to strip it and dye it bagged. He was a believer in ammonia. Most of the fast chrome dyes now used were started in an alkaline bath, which did not become acid until near the boiling point, and the goods apparently did not suffer to any extent. But ammonia attacked the copper parts of the machine, and the most common trouble when using fast chrome dyes was the production of metallic stains. The only way to prevent their formation was to use machines in which copper and iron are absent. Careful supervision in crabbing and scouring and milling, a correct speed for the dyeing machine, and, where there was a tendency to list, the use of bagging, were the precautions which he thought would overcome the difficulty they were discussing.

R. Horne said he did not think bagging was an absolute cure. With regard to stripping, in the case of

indigo and most blues, he found listed pieces would strip better in the hydrosulphite bath after treating with ammonia.

Mr. Stapleton said that bagging might remedy the defect if it was caused by dyeing, but if it was due to size or a defect in manufacture, it would not be a remedy.

Mr. Hollingworth said that in the case of Coomassie Navy Blue the best way of stripping was a strong solution of Glauber's salt and ammonia.

In reply to a question by Dr. H. H. Hodgson, Mr. Stapleton explained that "bagging" meant the sewing together of the two lists or selvages, so that the piece formed a tube or bag. The stitches were kept about 6 inches apart to allow the dye to penetrate. Of course, bagging did not cure all kinds of listing. It was used when pieces were found to curl when wet.

In reply to Mr. Copley, Mr. Stapleton said the list was usually darker than the center of the cloth. Occasionally only one list was affected.

Mr. Copley said he had been told that in worsted spinning there might be too much tension in the spinning, or the yarn might be wrapped too tightly on the cop, and it would then show weft marks. There would be no apparent difference in the loom, but the thread would be under tension, which would affect the taking-up of color. In cotton dyeing, when they dealt with solid cloths like gabardines, where very exact shades were required, great importance was attached to the tension of the warp when dyeing. He thought the same thing would apply with woollens. Again, in dyeing a piece in rope form, the edges would be freer and more easily acted upon by the liquor; while the center of the piece would take most of the pull. If the piece were bagged, it would remove the looseness of the edges.

Mr. Wood said he thought listing was caused chiefly by defects in two processes—weaving and crabbing; and he believed the latter was the more important of the two from the dyer's standpoint, because with bagging the tension of the warp would not be dangerous. If any soap or fatty matter were left in the piece it would tend to travel to the list. The fatty matter might cause a dark or a light list.

Mr. Stapleton said it would usually cause a light list. The dark list was the principal trouble.

Mr. Wood asked if the dark list could be caused by there being too much water in the steam, because wool boiled in water would come up a little darker than wool which had not been so treated. Naturally, the lists of the pieces would be more exposed in the crabbing machine and more water and condensed steam would be present. Another list defect could be caused by the edges absorbing moisture after drying more quickly than center of the piece, which changed the color of some dyes.

Mr. Stapleton said that though they might crab the coarse goods and lighter weights, they did not often crab a good botany of 18 oz. weight, and yet pieces were listed where there had been no crabbing done.

Listing could be caused by crabbing, he agreed, and also by the steam.

Mr. Hollingworth said there was no doubt a listed piece could be caused in half a dozen different ways. He thought the size which was used nowadays caused much trouble. Some of the sizes used were acid, and if they were absorbed unevenly trouble would result.

The Chairman said he did not think any size would be sufficiently acid to cause trouble of that sort. If the size dried on the cloth it would form a hard film and be difficult to wash off.

Mr. Mallinson said that would hardly explain a list which was darker than the middle. It was usually said that when the list was lighter it was not the fault of the dyer, but when it was darker the dyer was blamed.

Mr. Hollingworth said he did not agree with that, because the fault might be regular from one end of the piece to the other.

Mr. Horne said the general appearance of the piece might be that it was evenly dyed until the list was brought close to the middle for comparison.

Mr. Morton said he thought that size caused a lot of listedness, altogether apart from weaving.

Mr. Mallinson said that size would tend to make the list lighter, and Mr. Hollingworth replied that he thought crabbing would send the size to the edges.

Mr. Stapleton said that hundreds of pieces in Huddersfield and Bradford were listed which had not been through a crabbing machine, and what would be passed as satisfactory for a crossbred or for the Dewsbury trade would not pass for a Botany.

Mr. Whalley said he was assured by a Bradford manufacturer that very few warps were sized nowadays. Mr. Stapleton, however, said he thought the majority of the lighter weights were sized. It was very seldom that soft goods were listed.

The Chairman raised the question of the effect of oil, and Mr. Hollingworth said that on certain pieces they got what were called drought marks, which he attributed to the oil having oxidized so that it could not be scoured out.

The question of "flecked" pieces was then raised, and Mr. Stapleton said he did not think that the fault was at all common nowadays. He had not seen a flecked piece for months. Flecking might be due to soaping, but was generally a dyeing fault. It was caused probably by entering the liquor too quickly or too hot.

In reply to a question, Mr. Stapleton said some dyers ran the pieces dry into the liquor if they had previously been scoured, but they allowed them to get thoroughly saturated before any steam was put in, otherwise fleckiness would be caused.

Mr. Horne said that in scouring a good deal of marking was caused by running the material through in a semi-dry state in the washer. There would be less marking if the pieces were thoroughly wetted out before scouring and also less need for crabbing, which tended to cause listing.

Mr. Whalley asked if it would lessen the risk of list-

ing if the pieces were kept opened out until they got to the boil.

Mr. Stapleton said in that case they would only be able to do three pieces instead of five, and output would be lost.

#### JANUARY MEETING

James Hollingworth, in reopening the discussion, said that faults in woolen and worsted piece goods was such a big subject that at the December meeting the whole of the evening was devoted practically to one fault, listed pieces. It was not possible, except in a few isolated instances, for a dyer to create that fault. The difference in shade between the body of the piece and the lists was usually the same from one end of the piece to the other, and to have a piece running in irregular rope form over the winch of the dyeing machine, with sometimes the list exposed for a few yards and sometimes the list wrapped inside the body of the piece, was to have a condition of things which could not result in a regular dark or light list throughout the piece.

In the case of Indigo dyed in the vat, the fault might be caused in the dyehouse. If the hawking machine was not well under the liquor, or if one end of the machine was nearer the surface than the other end, or if the workman in keeping the piece running straight pulled up the list so that it became exposed to the air, then such conditions might cause a listed fault, because the list would be running in a more oxidized portion of the liquor than the body of the piece, and would therefore be darker. Also in the case of such cloths as union gabardines, which were wool-dyed first and afterwards cotton-dyed on a padding machine, a listed piece might result from the uneven nip of the squeezing rollers. Except for such isolated cases, the cause of a listed piece must be looked for outside the dyehouse. For instance, the use by a manufacturer of an oil containing an excess of unsaponifiable matter or of an inferior insoluble size would most certainly cause trouble to the scourer, finisher, and dyer. If pieces containing such impurities were put through the crabbing process there was a liability to cause a listed piece, because in that process the greatest pressure in the crabbing rollers was in the middle of the piece, and this would squeeze the impurities towards the lists, and thus affect the subsequent dyeing.

Coming next to flecked pieces, this was a trade term for an unevenly dyed cloth which had a cloudy or patchy appearance. The majority of flecked pieces were the result of imperfectly prepared pieces as received by the dyer. In the case of woollens and woolen weft goods, a cheap blending oil used in the teasing room could cause great damage. Careful supervision in scouring and milling was essential to avoid flecked pieces. Not only must the scourer give every attention to each batch of goods, but a careful selection of materials would help him in turning out satisfactory work. The scourer needed a soft water, a pure alkali,



a good soft or hard soap, and ammonia. If the water was above 5 to 6 degrees of hardness the scourer was greatly handicapped both in turning out efficient work and in cost of materials. The best alkali was the cheapest and most efficient. Soft soap was the better soap, but, if too expensive, a soda soap made from a low melting point oil was preferable to one made from a fat like tallow, which had a comparatively high melting point. The former soaps were more soluble, and therefore easier to get away from the goods. If, owing to faulty scouring or the use of a too-hard water, the goods were delivered to the dyer containing too much soap, the result was very often a flecked piece.

Carbonizing was a process which, like scouring and milling, easily lent itself to faulty work. The wool fiber had a great affinity for mineral acids, and these in turn absorbed most wool colors so rapidly that unevenly dyed pieces frequently resulted. He suggested that in milled goods the carbonizing process should take place after scouring and before milling. This would necessitate a thorough neutralizing before milling, and was therefore more expensive than carbonizing immediately before dyeing. For these goods the dyer was wise to select the most soluble and level-dyeing colors at his command. One of the largest manufacturers and Government contractors whose works were self-contained, starting with the greasy wool and producing the finished piece, had experienced so much trouble with carbonized goods that he had put the carbonizing process after dyeing, and was doing this very successfully. This method was satisfactory for dyers who were in a position to carbonize their own goods, but to send dyed goods out to a commission house where all kinds of goods passed through one carbonizing bath might be dangerous.

With regard to the question of the dyer's responsibility, given a good clean piece, there was no reason why the dyer should not produce a level-dyed result, if ordinary precautions were taken. Most dyestuffs required starting at a low temperature and gradually raising to boiling point. A few, such as Alizarine Brown or Khaki Brown, dyed by the one-bath method with chrome, required a higher temperature at the start, because if the temperature of the bath became too low the tendency was for the color to fall out of solution, and it was then impossible to dye evenly. Some dyestuffs had the peculiar physical property of forming a tarry body which was dissolved only with great difficulty. If the bath were first made alkaline with ammonia these dyestuffs would dissolve easily, and dye without fear of color spots or stains. A precaution against flecked pieces when applying mordant colors by the afterchrome process was to cool down the dye bath before the addition of the chrome. Very often a flecked piece might be the result of careless "salting" when making additions to the dye bath during the dyeing process to get to shade. On the other hand he had known cases, in dyeing light shades such as biscuits, fawns, light gray, etc., with a combination

of fast-to-light acid colors, when a salting or addition of some level-dyeing color tended to improve an otherwise "skittery" or imperfectly dyed result. In loose wool dyeing in the open pan he had found it impossible in some cases to obtain a level result without salting. In such cases the bath was charged with less color than would be required, and the remainder salted in, say, after half an hour's boil.

Another point which was often overlooked was the speed of the winch dyeing machine. In using some dyestuffs the speed did not matter very much, as they were so level-dyeing that the goods would be perfectly dyed if the winch was simply creeping round; but in the case of the more insoluble mordant colors, it was necessary to pass the goods through the dye bath at a speed sufficiently rapid to obtain a level result.

With regard to stained pieces, most dyers have had pieces returned to them bearing tickets marked "dyers' stains." These could be classified as oil stains, loom stains, draught or weather stains, metallic stains, and mildew stains. In this connection what dingy, cold, ill-lighted and unprotected places most of the older dyehouses were! Even in the middle of the day it was like working in a tunnel, and it was really surprising that stains and such faults were not more frequent under such conditions. The more modern and ideal dyehouse eliminated drop stains so far as the dyer was concerned. It was electrically driven, a small direct-drive motor to each machine; there was no shafting and countershafting with its cogwheels and miles of belting throwing off grease and a constant stream of rusty water. Each machine would be hooded, and the steam conducted to a central heated channel (to prevent condensation), and drawn out into the open air by a sufficiently powerful fan.

He was unable to say how the draught or weather stain got its name. It usually occurred as a light-colored patch which had resisted the dye, on the edges of the goods and across from list to list and up the center of the piece if it had been folded or rigged and in stock for some time. It was the result of the oxidation of the oil in the goods. Given proper conditions, this oxidation could become far enough advanced in one or two hours' time to cause this fault. Absolutely clean material, free from oil or soap, could be kept in stock without much fear of this fault developing, but goods which had been in stock for any length of time should always be rescoured before dyeing. Even then the level-dyeing acid colors would be safer than the mordant colors.

Metallic stains were mostly from iron and copper, and occurred more frequently in milled goods than in plain clear-cut goods. They were the result of the sensitiveness of most of the fast-to-light mordant colors to these metals, and were always liable to occur in goods which had been scoured and milled in machines fitted with brass, copper, and iron parts.

Another fault took the form of marks or lines or streaks running irregularly warp way of the piece.

These, in his opinion, were purely mechanical faults, and might be called a very mild mill-rig. It was a serious fault, and sometimes difficult to remove. It occurred both in crossbred and botany qualities, and he suggested that the fault started in the scouring machine through overcrowding and was aggravated in the dyehouse. If, through overcrowding in the scouring machine and the use of too little scouring liquor, the goods were unable to change their position, and were kept more or less in the same folds for the whole of the scouring process, then the liability to develop streaks was very great, and the subsequent dyeing would certainly not improve the goods.

There were other faults, such as those experienced by the dyer of union goods, cotton and silk-effect goods, and the difficulty of matching shades in daylight and artificial light; but he thought he had enumerated sufficient for the discussion that evening.

In reply to the Chairman (Dr. L. G. Paul), Mr. Hollingworth said that in speaking of carbonizing he meant carbonizing in the piece. Vitriol was usually used; he did not think aluminium chloride was used.

The Chairman said he thought aluminium chloride, which used to be largely used, would be advantageous after dyeing, because it would not have such a strong action on dyes as sulphuric acid.

E. Stapleton said that the "bagging" of pieces would not prevent them from being listed if listing were due to the causes Mr. Hollingworth had mentioned. If one got a very hard cloth, say 19-20 oz., 120 picks, running over the winch and kept in that position for most of the time it was in the bath, there was a possibility of listing through the dye being unable to penetrate. Opening the pieces out with the aid of a stick was a very successful methods, but it lowered the output. In his opinion bagging was useless unless all the oil and size had been taken out of the piece, and the dye used was a suitable one.

J. Hollingworth said his view was that if a listed piece was the fault of the dyer, that fault could be corrected by dyeing subsequent pieces bagged; and also, if a flecked piece were turned out in the dyehouse, the only way to correct it was to bag it, strip it, and redye it bagged.

D. T. McLellan asked if any tests had been made to determine the relative amount of grease and soap on the lists and on the body of the piece. Were the pieces steamed after crabbing, because if the goods were not well set in the crabbing and steaming processes they were liable to have curled edges?

Mr. Hollingworth said there was very little crabbing in the Huddersfield district.

Mr. Stapleton said the list was darker than the body of the piece in nine cases out of ten. The pieces were not usually curled. Pieces had been frequently tested and an excess of grease found in the lists.

T. Lovelace said that recently he had followed up a case in which the warps had been sized, and also waxed as they went into the loom. Those pieces were standing in the gray room for a few days, and when

dyed they showed light edges and light piece-ends. Was listing often caused in that way?

Mr. Hollingworth said that there were many inferior insoluble sizes on the market at present, and if the pieces were crabbed or put through any process which would tend to concentrate the impurity into one portion of the piece, that portion would be faulty.

R. Heaton said paraffin wax was used by the weavers—often an ordinary white candle. The wax could be removed completely by blowing with steam. In the astrachan trade the wax had to be used for every pick, and the rods had to be greased.

The Chairman said the wax could be removed by the solvent process.

Mr. Lovelace asked if burst warp or weft threads could not result from blowing with steam, but Mr. Heaton replied that that did not occur.

The Chairman said that with regard to the hardness of water, for the scouring of fine Huddersfield goods water of five or six degrees was too hard, and in his experience a number of defects such as spotty goods and stains had been due to that, also smelly pieces. Many people used permutit plants for such water.

D. T. McLellan asked if volatile solvents were used in scouring in the Huddersfield district, because that enabled less soap to be used, and there was less danger of leaving soap in the piece. He referred to tetralene and similar products.

R. Horne said that they were in the habit of treating all goods which were received from commission scourers with a volatile solvent and warm ammonia, and this practice had been successful in reducing the listedness very much.

J. W. Thorpe said that many firms who had had much trouble with listing had absolutely eliminated it by using open-width scouring machines. The listing was due to unsaponifiable oil or insoluble size, which could not be got out by rope scouring, but was removed by flat scouring.

In reply to further questions, Mr. Thorpe said the process of open scouring did not lessen output. Twenty pieces per day could be done, with cloth weighing anything from 8 to 20 oz. and up to 66 in. width.

Mr. Hollingworth said they had two machines and got a fair amount of success, but not the output; certainly not twenty pieces a day.

Mr. Stapleton said the open scourer was good for a not too heavy cloth which had to be got out to width.

Mr. Thorpe said the width could be got up from 57 or 58 to 66 inches in an hour's scour. One disadvantage was the tension. The piece was lengthened two yards, and the finisher had difficulty in getting his weight. The machine did not mill at all, and the goods required no crabbing. No solvents or soda were used—only soap and ammonia. Two pieces were done at once.

Mr. Lovelace suggested that the machine would not pull if the back roller were speeded up.

The Chairman said Mr. Thorpe's remarks would



imply that listing was caused by something which a thorough scouring removed.

D. T. McLellan suggested that a piece should be sent to dry cleaners and thoroughly extracted and dyed along with other pieces which showed listing. That would prove conclusively whether grease was the cause of listing.

Mr. Mallinson said that they had had trouble with goods which showed a band six inches broad right across the piece every six inches. This was shown to be due to different yarns having been used. When listing was due to a weaving fault, the threads being tighter in the center and slacker towards the list, would not an open width scouring machine tend to rectify that fault by pulling the cloth into position, whereas a rope scouring machine would emphasize the weaving fault?

H. Downs said he had found that in some cases oils had been used for blending which contained up to 40 per cent of hydrocarbons. In scouring the fatty acid was removed, but not the whole of the mineral oil, and the latter would possibly go towards the edges of the piece.

The Chairman said that at any rate in high-class goods very little oil was used except the high quality Gallipoli oil. He did not think Bradford spinners used anything but an entirely saponifiable oil.

Mr. McLellan said that in the Bradford trade the goods were crabbed and steamed, and when dark lists appeared they were attributed to the goods standing all night in a vertical position on the steaming can, and the size and grease running down to the edge.

Mr. Heaton said he had been looking at some old books belonging to his firm dated 1826, and he found they were troubled with listed pieces then.

L. Barker said that if goods went straight from the scourer to be dyed it would prevent a good deal of listing.

The Chairman said that two of the principal causes of irregularity were water and the nature of the oil.

Mr. Hollingworth said he had had an instance in which pieces had developed draught stain in coming from Bradford to Huddersfield.

H. E. Wood inquired if any class of color was more liable than another to cause listing.

Mr. Lovelace said acid dyes were rather more liable to cause trouble than chrome dyes.

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### VAT DYES FOR WOOL

Textilberichte, 1921, 2, 352, through the Journal of the Textile Institute:

The use of vat dyes for wool is recommended. The advantages claimed are: Better results, less loss in milling, improved fastness and elasticity of the wool when compared with chrome dyed colors. The low temperature of the dyeing operation maintains the wool in a soft and loose condition. The saving of coal

is important: 100 lbs. of wool requires 34 lbs. steam for dyeing with vat colors, whereas a chrome dyeing requires above 340 lbs. of steam.

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### ELECTRIC AIR HEATING FOR TEXTILE MILLS

It has been an accepted fundamental principle that electricity could not compete with coal for the heating of buildings. Recent investigations have been made, says the "Electrical World," which show that electricity can compete with coal, taking all the facts into consideration, when energy is obtainable at one cent a kilowatt hour and coal is \$8 a ton.

The Canadian Cotton Company of Canada, after a thorough investigation and examination, has entered into a contract for the electrical heating of one of the new mills it is building at Milltown, New Brunswick. The building is 184 ft. (57 m.) wide by 410 ft. (134 m.) long, two stories high, and has an installed capacity of 2,200 kw. for maintaining a temperature of 65 deg. Fahr. within the building when the outside temperature is 20 deg. below zero.

A hot-air system of heating is employed, this being recognized as the most effective manner of heating the building, besides providing good ventilation at all times. During the summer the system may be operated as a strictly ventilating system without the heat being on. This does not interfere with the humidifying system usually employed in textile mills, and as a matter of fact it should result in a more uniform humidity being maintained.

The heaters are concentrated into two centralized systems, one for each half of the building, and are placed in housings similar to those used with steam coils, the air being drawn through the heaters by a suction fan and distributed through the building by means of vent pipes.

Electric contact-making thermostats are used for maintaining the temperature constant within narrow limits. These, in connection with magnetic contactors, hold the temperature constant, continually and entirely automatically, at 65 deg. Fahr. throughout the entire twenty-four hours, irrespective of the outside temperature. The installation is thoroughly safeguarded, so that in the event of the power going off the motor driving the exhaust fans, the current is automatically cut off from the heaters. It is further safeguarded to the extent that if the temperature within the heater housing goes beyond a predetermined limit the heaters are automatically disconnected from the line. In the event that the temperature within the room should go beyond a given point owing to the possible failure of the controlling thermostats, a separately operated thermostat will cause the sounding of a loud gong, which will be sufficient to attract the attention of the watchman day or night.

By the electric heating of mills, particularly where water power is available, an enormous opportunity is provided for conserving natural resources, especially

coal. It is to be hoped that steps will be taken at once by those companies fortunate enough to operate plants deriving their power from waterfalls, or those that

purchase power from water-power plants, to investigate the advantages offered by means of electric heating.

## Fastness of Basic Dyes to Light

Sacrifice of Other Qualities to Obtain Light Fastness—General Attributes of Basic Dyes—Basic Dyes Possessing Good Light Fastness—Rhodamine B and Prototypes—Methods of Application—Resorcin Blue—Dyes for Tin-Weighted Silk and Application Methods—Notes

By GEORGE EMMONS

**I**N prior articles, particular attention was given by the writer to fastness to water and fastness to washing. But fastness to light has not been especially treated, although incidental attention has been given. In the present article, it is proposed to specialize on fastness to light. I hasten to point out that, in seeking this particular quality, some other quality will often have to be given up. There is probably no single dyestuff in all the world that possesses all the good qualities in a high degree. But fastness to light will sometimes become so desirable that reductions in certain other qualities become more or less endurable. This is particularly the case with silk.

In the first place the basic dyes are the most brilliant of the coal tar colors. They have a great affinity for silk fiber because of its natural acidity, and produce colors of great brilliance and beauty. Unfortunately, however, these dyes have, as a class, rather moderate fastness to light. This naturally restricts their use to such fabrics as will not in service be much exposed to light. There are, however, two or three or more basic dyes having a good fastness to light on silk, whatever defects they may have along other lines. I mention Rhodamine B, Rosazeine B, Safraniline, Ethyl Green, Malachite Green, Diphen Blue.

There are several other basic colors which produce on silk weighted with tin a very good fastness to light. I mention the following: Methylene Blue, Methyl Violet (reddish brands).

Of the foregoing, Rhodamine B, Rosazeine B and Safraniline, are all similar dyestuffs in respect to their constitution, and may be assumed to be more or less alike in their behavior. It will, however, not be safe to depend too much upon similarity. The following remarks apply especially to Rhodamine B. The dyeing is to be done as follows: The dye bath is prepared by using about 10 per cent of the volume in boiled-off liquor; or else in a bath which has been slightly acidulated with a suitable acid. This latter bath may contain boiled-off liquor, too. Acid in the bath is claimed to keep the color off the silk and to prevent exhaustion of the bath. In case the water is hard, acetic acid may be employed to correct this condition. If scum comes to the surface, it should be removed by skimming or otherwise, prior to entering the silk. Before putting

in the dye, the silk is entered, the bath at the time being at a temperature of 40 deg. Cent. (= 104 deg. Fahr.). After it has been worked or turned for a short period, the dyestuff is to be put in in the form of a solution. The silk will have been removed before the dye is put in and then put back. The idea here is to prevent localized effects of the dye. The silk is now rapidly handled for a few minutes and the heat pushed up to 60 deg. Cent. (= 140 deg. Fahr.) and eventually to the boiling point. The silk may be dyed without boiled-off liquor. It is then entered at 60 deg. Cent. (= 140 deg. Fahr.) and the heat is afterwards pushed up to 80 deg. Cent. (= 176 deg. Fahr.). Enough acetic acid is to be added to exhaust the bath.

The shade produced on silk by Rhodamine B is not merely fast to light in a good degree, but it has also a good fastness to water. This latter fastness means that there is resistance to the loss of dye in the cold water in which a dyed sample has been immersed for twelve hours. The shades on silk are very bright and may be described as bluish-pink with a red fluorescence.

Bright red colors, beautiful and pure, may be produced by mixing Rhodamine B with azo oranges and azo scarlets.

The following dyes resemble Rhodamine B. Rhodamine G, Rhodamine 3B, Anisoline, Rhodamine 6G, Trianisoline, Rosazeine 6G.

Ethyl Green and Malachite Green may be regarded as more or less similar. Both produce on silk colors that have a good fastness to light. Perhaps Ethyl Green is somewhat yellower and more brilliant in shade. Malachite Green may be dyed in a bath prepared with one-tenth of its volume consisting of boiled-off liquor. This bath will be somewhat alkaline. This is to be corrected with sulphuric acid, but not to complete neutrality. The bath is to be slightly alkaline. The bath is to be heated 70 to 80 deg. Cent. (= 158 to 176 deg. Fahr.) and the color added in the form of a solution. After the bath has been well stirred, the silk is entered and worked or turned for, say, thirty minutes. It is then washed. Next, it is given a brightening treatment with acetic acid. Afterwards, the work is to be dried.

Either an acid or a basic color may be used in the



same dye bath along with Malachite Green for the purpose of modifying the shade. If Picric Acid is to be used with Malachite Green for the purpose of shading the latter, then it will be advisable that the dyeing with Malachite Green should be completed and the Picric Acid used subsequently for the topping operation.

Perhaps this is as good a place as any to call attention to the following silk dyestuffs Resorcin Blue, Fluorescent Blue, Iris Blue.

These are understood to be more or less alike, although my remarks will apply especially to Resorcin Blue. This dyestuff comes on the market in the form of an olive-brown liquid containing small, green crystals. The whole may be dissolved in water, when the color will become violet. Apparently, this dyestuff is not especially suitable for cotton and has no particular vogue amongst wool dyers. But silk is another matter. "It dyes this fiber with a blue-violet color of a remarkable reddish fluorescence which is seen very prominently in gaslight; when used in combination with other coloring matters it gives pleasing shades, all possessing fluorescence." The color produced on silk is very fast to light. Further, it has also a very good fastness to washing and acids.

The dyeing may be done in a bath, 10 per cent of whose volume consists of boiled-off liquor. Acetic acid may be used to acidulate the bath slightly. The color may be brightened by the proper use of acetic, tartaric or sulphuric acid.

#### TIN-WEIGHTED SILK

If the silk be weighted with tin, then Methylene Blue and Methyl Violet (reddish brands) come into consideration, if fastness to light is demanded. The basic dyes in general have a good affinity for the tin-weighted silk fiber. This makes the dyeing easy. The silk is to be carefully washed in warm water for the purpose of getting rid of any bits of metallic salt that may be adhering to the fiber. If the silk has been weighted and has since been kept in stock for any considerable period, the metallic weighting may have suffered decomposition to some extent. If so, unevenness of shade may be the result obtained upon dyeing.

Methylene Blue and Ethylene Blue may be regarded as similar dyestuffs. Methylene Blue may be used with Methyl Violet, Malachite Green, Safranin, etc., to produce compound shades. In fact, the Marine Blues are mixtures of Methylene Blue and Methyl Violet. One authority does not recommend Methylene Blue very highly for use on silk to produce blue shades, his reason being the existence of other blue dyes which possess a higher degree of brilliancy and fastness. However, we are now concerned, not with the simple use of Methylene Blue, but with its employment on silk weighted with tin. The weighting of silk with tin is accomplished by the use of stannic chloride and sodium phosphate, the object in view being reduc-

tion in price. The weighting has to be done with much care, otherwise there is an unevenness of precipitation of the salts. This naturally will occasion uneven results in dyeing. Unevenness in dyeing may also be brought about, as already indicated, by a prolonged storage of the tin-weighted silk prior to the carrying out of the dyeing operation.

Silk that is to be weighted with tin may be treated in the raw state, "since it would have to be soaped again after being mordanted." The older methods proceeded by steeping the fiber in a solution of stannic chloride (having a density of 32 to 52 deg. Tw. = 1.160 to 1.260 sp. gr.) until thorough impregnation has taken place. The fixation of the tin is secured in the following way. The silk is wrung out, the excess liquor being put back into the bath, and then rinsed in running water. The object here is to secure precipitation of stannic hydroxide in the fiber. The removal of the soluble acid salt is accomplished by washing. Often, the fixation is brought about by a cold solution of soda. It is said that by repeated operations the weight of the silk may be increased to 25 per cent. The solution of stannic chloride is to have a moderate strength, as a solution having a strength indicated by 50 deg. Tw. (= 1.250 sp. gr.) is competent to produce perceptible shrinkage of the silk; and one having a density of 100 deg. Tw. (= 1.500 sp. gr.) will effect initial dissolution of the fiber. It is necessary to soap repeatedly at the boil in order to get back the natural "feel" of the silk. The foregoing method may be improved by the use of sodium phosphate. That is to say, after the silk has been allowed to steep in the stannic chloride and has duly rinsed in water, it is given a treatment in a solution of sodium phosphate and then given a good rinsing. The phosphate solution is first to have a temperature of 50 to 60 deg. Cent. (= 120 to 140 deg. Fahr.). The silk is worked for half an hour at this temperature. Then it is worked for a second half-hour with the solution boiling. The treatment is given a number of times. In the final treatment, enough sulphuric acid is to be added to liberate a third of the phosphoric acid. This method is a double improvement, (1) because it does not injure the fiber to the same extent, and (2) because it produces a higher weighting effect. Indeed, the improvement may go further. In the older method, it was sometimes the custom to use tannin in the form of tannic acid, sumac, catechu or the like, as a second medium of weighting. This weighting was done subsequently to that effected with stannic chloride. It was supposed to have a beneficial effect by way of preventing deterioration of the fiber as well as by way of adding to the weight. When the treatment with stannic chloride is followed by that with sodium phosphate, the treatment with tannin becomes unnecessary. Consequently, "the white color, the gloss and the feel of the silk are much better preserved." Other improvements have been made, but I scarcely have space to describe them.

It has been claimed that if the tin-phosphate procedure is used in weighing silk, tendering that may oc-

cur later may be corrected by a treatment of the silk in a bath containing hydrofluoric acid.

The methods outlined for tin-weighting may be regarded as suitable both for light-colored as well as black silk.

In order to dye silk with Methylene Blue or Ethylene Blue, a bath containing boiled-off liquor to 10 per cent of its volume may be employed. After the dye solution has been added to the bath, the silk is entered. The whole is then heated to the boiling point and the dyeing prosecuted for twenty minutes at the boil. The silk is then washed and afterward brightened with acetic or tartaric acid. Finally, it is dried. The precaution of giving tin-weighted silk a washing in warm water prior to dyeing has already been mentioned.

#### SOME REMARKS

There is a small problem connected with the preparation of the dye solution which is destined to be added to the dye bath. If boiling water is used as the basis of the solution, trouble may ensue because of a partial decomposition of the dye and the consequent formation of tarry matters. Instead of plain water at the boiling point, one may advantageously employ warm water, to which a small addition of acetic acid has been made. In certain cases, it may be best to use a small quantity of methylated alcohol as an assistant in dissolving the dyestuff. Another assistant that is used at times is acetin. This is a mixture of the acetic ethers of glycerin and may be prepared by boiling glycerin with glacial acetic acid.

When using Auramine, the dye solution should not be heated up beyond 170 deg. Fahr. (= 77 deg. Cent.). Otherwise, the dye will be more or less decomposed and a precipitate formed.

Bismarck Brown and Chrysoidine may both be used for silk. The solution should, however, not be boiled for any length of time. Bismarck Brown produces a bright shade of brown which resembles the shade produced by Catechu, only it is redder. But the color lacks fastness to light and soap. Both Bismarck Brown and Chrysoidine may be dyed on silk in the same manner. That is, a weak soap bath at 50 or 60 deg. Cent. (= 122 or 140 deg. Fahr.) may be used for the dye bath. After the fiber has been dyed in it for half an hour, it is washed and then brightened with acid—acetic, tartaric or sulphuric. Finally, the work is wrung and dried. Both dyes are soluble in plain water. Bismarck Brown may be properly prepared for use by dissolving it in water containing no lime, or in water in which the lime content has been neutralized by the addition of acetic acid. A temperature of 80 deg. Cent. (= 176 deg. Fahr.) may be employed in dissolving the color. The resulting dye solution may be kept for a period, but not indefinitely. A slow decomposition takes place spontaneously.

While fastness to light has been emphasized in the present article, it should be remembered that it is also desirable to have fastness to water—that is, immunity

against bleeding after a steeping in cold water for twelve hours. Basic dyes are not naturally strong in this respect. But their ability to be fast to water may sometimes, at least, be increased by working the dyed silk for a quarter of an hour in a bath containing from 5 to 10 per cent of tannic acid, the bath being at a temperature of 140 deg. Fahr. (= 60 deg. Cent.). Next, the work is squeezed and then worked in a bath containing from 2½ to 5 per cent of tartar. The silk is next allowed to steep for twelve hours, after which it is washed thoroughly and dried.—*Silk*.

### INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

T. C.—*Question*: I am dyeing fancy shades with fast acid colors and always note that my batches dry up to a different shade than my sample. This causes a great deal of trouble and I would appreciate it if you could explain the possible cause.

*Answer*: It is a well-known fact that practically all dyestuffs, both direct and acid, as well as other varieties, are altered in tone by heat. The main cause of this is the simple loss of moisture due to drying, which, when the fiber regains its normal condition, allows the shade to return. However, there are some dyes that are permanently changed, and at the present time there are some containing traces of impurities which cause a permanent change in dyes which, under ordinary conditions, are not affected by heat. The heat conditions under which you dry your samples are possibly not identical with the conditions in your regular dryer, and this may possibly account for the variation in shade.

W. M. O.—*Question*: We have had much difficulty in dyeing navy blues on cotton fabrics, using Blue 2B, Direct Black and Benzo Purpurine 4B. Every lot shows bronzy streaks, although the dyeing appears to be as even as possible and is well rinsed. What causes this, and what remedy do you suggest? We have tried dyes from practically every dealer in the business.

*Answer*: The trouble you mention is caused by the water in the goods which, in the heat of the drier, redissolves the dye off the fiber and, by capillarity, flows to



the edges and dries. So much dye is dissolved off the fibers in this way that the points where it dyes become bronzy from the excess of dye at those places. The best remedy is to set the dye, or make it insoluble, by a rinse in weak acetic acid or alum, before whizzing and drying. Another remedy is to use Black BH as a basis of navy blues.

C. R. S.—*Question:* How are colors fast to hot soap and light dyed on thread silk?

*Answer:* A few are diazotized and developed dyes and a few are vat dyes, but the majority of browns, grays, modes, etc., are chrome mordant colors. This is shown by the green ash left on burning a sample of the silk.

The boiled-off and dried silk is laid overnight in a solution of chromium chloride of 20 deg. Tw., then whizzed and fixed in a bath of 1 to 2 deg. Tw. of sodium silicate, or sometimes sodium phosphate; then rinsed well. The dyeing is done in a neutral, broken soap bath with the ordinary mordant dyes, either azo or alizarine, at a temperature just below a boil. If the bath is distinctly acid the results will not be as satisfactory, as the dye then goes on as an acid color without properly uniting with the chrome. It is not practical to dye after-chrome colors on silk, as the fiber is injured by the action of the bichromate.

W. W. A.—*Question:* Will basic dyes color unmordanted cotton under certain conditions?

*Answer:* Yes. Light tints of good fastness to washing may be obtained on cotton that has been bleached, but not on raw cotton. Fuller shades may be dyed from an alum bath, even on raw cotton, but are likely to rub. Shades have been made using basic dyes, tannin and acetic acid in one bath, but these are hardly practical.

W. L. J.—*Question:* How much Metatoluylenediamine is actually required to develop a full shade of black?

*Answer:* Practical trials have shown that between one-half and three-quarters per cent are needed, but actually one per cent is used, so that there is sure to be an excess and so that the operation of developing will not take too long a time. If the theoretical amount only were used there would be a danger that the interior of the fibers would not be developed and the time necessary for the reaction would be unreasonably long. With an excess, the development is complete in a few minutes and there is little chance that it is not thorough.

The New Jersey Silk Knitting Company, West New York, N. J., has recently leased a part of a factory at Fifteenth and Washington Streets, in which it will install special Milanese, fast tricot and special tricot, as well as Jacquard, Raschel machines for the manufacture of lace novelties, veilings, goods for hosiery and underwear, gloves, shawls and worsteds.

## Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: \*Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

1154.\*—A firm of dry goods dealers in Canada wishes to purchase women's ready-to-wear dresses of cotton or silk, quilts and cretonnes. Quotations should be given f. o. b. port of shipment. Cash to be paid. References.

1184.‡—A commercial agency firm in Germany desires to secure the representation of firms for the sale of raw products such as cotton, cotton waste, linters, chemicals, oils, tobacco, rubber, wood, coal, iron and steel, and metals. References.

1166.†—A commercial agent in Argentina desires to secure an agency for the sale of dry goods, hardware, tin plate, tinfoil, foodstuffs, chemicals, etc. Reference.

1167.\*—A merchant in Austria desires to purchase dyed leather of every kind, especially leather for upholstering purposes; and to secure an agency for the sale of leather goods. Quotations should be given c. i. f. any German port. References.

1168.\*—An industrial company in Guatemala desires to purchase complete machinery for the manufacture of jute sacks, as openers, softeners, carding, drawing frames, spinning, warping, looms, and dampening, pressing, sack-cutting, and sewing machines, for an output of 2,000 bags per day; paper and pulp making machinery; and tractors and cultivating machinery. Quotations should be given f. o. b. New York or New Orleans. Cash to be paid. Reference.

1170.\*—There is a market in Spain for dry goods of all kinds, especially woollens, muslins, flannels, linens, canes, umbrellas, travelers' articles, perfumes, toys and notions. Quotations should be given c. i. f. Spanish port. Correspondence should be in Spanish. References.

1171.\*—Iceless refrigerators are desired by a mercantile firm in Canada. Quotations should be given f. o. b. shipping point. Cash to be paid. Reference.

1172.\*—The purchase is desired by a firm of merchants in Arabia of starch, cotton piece goods and general hardware. Quotations should be given c. i. f. Arabian port. Reference.

1087.\*—An agency is desired by a mercantile firm in South Africa for the sale of textiles, general hardware, groceries, foodstuffs, and advertising novelties. References.

910.\*—The purchase is desired by a merchant in England of sheetings. Quotations should be given f. o. b. New York. Terms: Payment against documents. Reference.

961.\*—An agency is desired by a merchant in Austria for the sale of raw cotton for mills. Quotations should be given c. i. f. German port. References.

### UNEVEN COLOR ON DYED SILKS

Unevenness of color can often be attributed to uneven weighting, uneven distribution of the dye, or variation in the size of the raw stock. There may be substances introduced into the silk which will not come off in the usual boiling-off or degumming process. If a piece of shady silk is submitted to a chemical test or analysis the percentage of dye, amount of weighting and other substances can be determined and the cause of the defect will be apparent.

The throwster may use an excessive quantity of oil and soap, or even grease, which is fixed in variable proportions on the fiber in the dyeing process. This may often cause the dyer a great deal of trouble and cause streaked silk, either directly by not taking the dye evenly or indirectly by causing overworking of the silk to obtain the desired shade. The oil, soap and grease present can be determined and the manufacturer should have his thrown silk inspected or analyzed before being sent to the dyer. The writer knew of a case where raw silk that happened to be a fine large thread was found to be treated with rice powder to make it bulky, when in reality it was a very slender fiber.

An excess of fat may be present on the raw silk and not only cause trouble in subsequent operation, but cause the buyer to pay for this at an expensive rate. Some silk has been known to contain over 8 per cent of fat, as against the normal 1 per cent contained in the original fiber. The percentage of ash from silk is of some consequence as it shows the amount of mineral matter present. If the percentage of ash is above the normal it shows that there is a mineral loading present.

A very prolific cause of unevenness in dyed goods of all kinds is the lack of proper cooling and conditioning after finishing, and many of the leading silk mills have installed a machine which prevents trouble from this source.

Nearly all the trouble encountered by manufactur-

ers, dyers, finishers and throwsters can be determined and the cause of the defect traced to its proper source. The manufacturer should protect himself by having all raw, thrown and dyed silk analyzed before accepting it as a good delivery, and by having suitable equipment.—"Textile World."

### Review of Recent Literature

*The Book of the World Cotton Conference.* Official report of the meetings held June 13, 14 and 15 at Liverpool, and June 16-22 at Manchester, 1921. 436 pages, 9 x 12. Published by the Executive Committee, 121 Deansgate, Manchester, England.

As is customary, this volume forms a complete and permanent record of the proceedings, addresses and personnel of the various committees of this event, and contains many interesting and valuable contributions to the literature of the cotton industry by recognized authorities. The addresses, which form the major portion of the record, include the following: "How Can the Quality of the American Crop Be Improved and the Supply Be Kept Adequate to the Demand?" by David R. Coker; "The Exploration and Development of New Cotton Fields within the British Empire," W. H. Himbury; "Universal Standards for American Cotton," William R. Meadows; "The Problem of Financing American Cotton for European Use," Willis H. Booth; "The Purchase and Sale of Cotton," A. Bryce Muir; "International Credits," Sir Drummond Drummond Fraser; "Financing Cotton Imports," Sir James Hope Simpson; "Yarn and Cloth Contracts," John Taylor; "Characteristics of Cotton Required by the Spinner and Present Defects in the Raw Material," William Howarth; "Quality and Nature of Cotton Yarns Used by the Hosiery Trade," William Davis, M.A.; "The Cotton Mill; Its Machinery and Equipment," A. J. Holt; "Comparative Statistics of the Textile Industry," Melvin B. Copeland; "The Scope of a Research Institute for the Cotton Industry," Dr. A. W. Crossley, C.M.G., C.B.E., LL.D., F.R.S.; "Cotton Statistics and the International Institute of Agriculture," Professor Umberto Ricci; "The Possibilities with Cotton Crops for Exact Reporting and Forecasting," W. Lawrence Balls, M.A., Sc.D. (Cantab); "Humidity and Ventilation in Cotton Weaving Sheds," Frank Scudder, F.I.C., F.C.S.; "Preparation of Cloth for Finishing," S. H. Higgins and Andrew Hodge; "Factory Accidents and Their Prevention," John Jackson, O.B.E.; "Hours of Labor in the Textile Industry," A. Thomas; "Transportation of Cotton," Arthur Watson, C.B.E., M.Inst.C.E.; "Financing the Mills," E. T. Parkes; "Economic and Insurance Necessity of Future Contracts," Edward S. Butler; "Needed Reforms in the Ginning, Baling and Compressing of Cotton," Albert L. Scott and F. S. Blanchard;



"Cotton Waste and Its Value as a Raw Material," J. Barber Lomax.

In addition to a complete record of the resolutions growing out of this conference, there is also given in the report a voluminous statistical appendix consisting of six sections dealing with statistics of Production, The American Crop, The Indian Crop, Egypt, Consumption and Prices. The consumption and prices statistical matter includes a classification of the world's cotton, the world's cotton 1902-1920 crops, and a summary of the smaller crops; the world's mill consumption, 1894-1921, balance of world's production and consumption, 1904-1921, world's consumption by countries, 1906-1913, world's consumption by countries and varieties, 1912-13-20-21, American consumption by varieties, annual, 1909-1921, and monthly, 1918-1921; history of cotton prices, 1770-1920, with index numbers, monthly spot prices of American and Egyptian in Liverpool, Alexandria and New Orleans, 1909-1921, monthly spot prices of various kinds of cotton in Liverpool, 1913-1921.

*Distillation Principles and Processes.* Sydney Young, M.A., D.Sc., F.R.S. 520 pages, 6 x 9; 200 illustrations; \$10.50. New York, D. Van Nostrand Company.

This is an exhaustive treatise written by chemists thoroughly conversant with the manufacturing conditions existing in the various industries, especially the new methods evolved out of the necessities of enormous production during the war period. In preparing it, the author, who is Professor of Chemistry in Dublin University, had the collaboration of Lieut.-Col. E. Briggs, D.S.O., D.Sc., T. Howard Butler, Ph.D., M.Sc., F.I.C., Thomas H. Durrans, M.Sc., F.I.C., Hon. F. R. Henley, M.A., F.I.C., and Joseph Reilly, M.A., D.Sc., F.R.C.Sc.I., F.I.C.

The contents include: Introduction, Apparatus Required; The Boiling Point of a Pure Liquid; Vapor Pressures of Mixed Liquids; Boiling Points of Mixed Liquids; Composition of Liquid and Vapor Phases; Experimental Determinations; Directions for Carrying Out a Fractional Distillation; Theoretical Relations Between the Weight and Composition of Distillate; Relation Between the Boiling Points of Residue and Distillate; Modifications of the Still-head; Bubbling Still-heads; "Regulated" or "Constant Temperature" Still-heads; Continuous Distillation; Fractional Distillation with an Improved Still-head; Distillation on the Manufacturing Scale; Fractional Distillation as a Method of Quantitative Analysis; Methods by Which the Composition of Mixtures of Constant Boiling-Point May Be Determined; Indirect Method of Separating and Components of a Mixture of Constant Boiling Point; General Remarks, Purposes for Which Fractional Distillation Is Required. Interpretation of Experimental Results. Choice of Still-head, Number of Fractions. *The Manufacturing Scale*—Acetone; Production of Acetone and *n*-Butyl Alcohol by the Fermentation Process, Production of Acetone by means other than Fermentation, Acetone Recovery; The Testing of Acetone and *n*-Butyl Alcohol. *Distillation of Alcohol on*

*the Manufacturing Scale*—Distillation of Mixtures of Ethyl Alcohol and Water (Theoretical); Distillation of Mixtures of Water and Ethyl Alcohol, with the Other Volatile Products of Fermentation; Stills and Distillation in Practice; *Fractional Distillation as Applied in the Petroleum Industry*—Introduction; Periodic Distillation; Continuous Distillation Under Atmospheric Pressure; Distillation Under Reduced Pressure; Various Distillation Methods; *Fractional Distillation in the Coal Tar Industry*—Introduction, Distillation of Tar; Further Distillation and Rectification of Primary Fractions of Tar; Fractional Separation of the Naphthas and Light Oils; *The Distillation of Glycerine*—The Distillation of Glycerine. *The Distillation of Essential Oils*—Theoretical, Steam Distillation; Technical. Preparation of Raw Materials; Distillation; Purification of Essential Oils, Appendix.

*Introduction to Textile Chemistry.* H. Harper. Macmillan & Co., Ltd. 3s. 6d. net.

This is a volume from Macmillan's "Life and Work Series." It gives a short account of the more important properties of the principal textile fibers and the materials used in their treatment; but the chief object of the book is to provide a series of experiments illustrating these properties, in order to interest students in various branches of textiles in the materials with which they deal. All the experiments outlined can be carried out with the equipment found in an ordinary chemical laboratory. The use of the microscope in measuring and examining textile fibers is dealt with, and the methods of carrying out experiments to determine or verify the characteristic properties of fibers. The effect of chemical reactions and various agents on textile fibers is dealt with in a suggestive manner. Notes are given on methods of identifying the different textile fibers. Brief notes are given on the properties of oils and soaps, water, testing for hardness, and water-softening plant. In a separate chapter a brief description is given of the chemicals in most common use in textile work and the purposes they are used for. Tabulated data and a glossary of terms complete the book, which represents very good value for the modest price charged. The book is really intended for the use of junior students in continuation schools, but contains much information that would be of service to textile students attending the evening schools.

Harry Whittaker, of Northborough, Mass., and Robert Whittaker and Anna T. Whittaker, of Westborough, are the incorporators of the Robert Whittaker Company, Northborough, Mass., incorporated, with a capital of 500 shares of no par value, for the manufacture of wool and woolen and worsted mill waste, shoddy, noils and waste. The new company will take over the machinery and plant formerly occupied by Whittaker & Bacon, Inc.

## Recent Patents

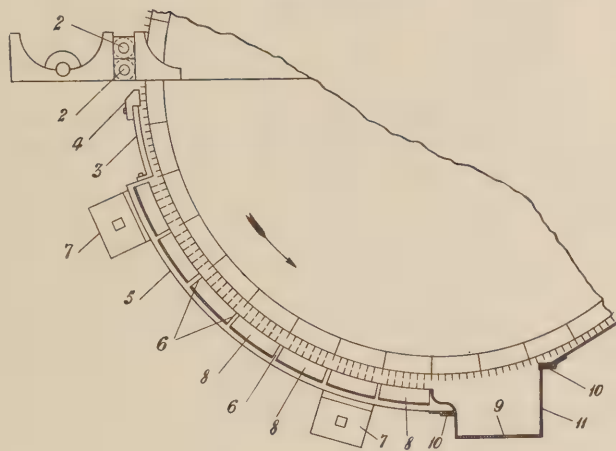
### Fiber Treating Machine

(1,407,364; February 21, 1922)

HENRY HIRST WALLER, Harrowgate, England

This invention relates to machines for opening all kinds of thread work, cotton, woolen, worsted, rags and the like, of the type in which a toothed cylinder or swift revolving in a casing receives from feed rollers the material, which then passes partly around the cylinder, between the cylinder and the casing, this operation being usually repeated in a set of several successive scutchers or opening machines in series.

Operator secures to the inner surface of the casing under the cylinder a metal segment having six or other numbers of ribs, between which ribs he secures to the



segment toothed lags, the teeth on which are just cleared by the teeth of the rotating cylinder. The cotton or the like in traveling through the machine is thus exposed to the combined action of the stationary teeth on the segment and the revolving teeth of the cylinder, and the lower layer of the traveling cotton not being shielded from teeth by the upper layer as before, the opening effect is so much increased that the operation can be performed as well by a series of a less number of cylinders or swifts as it has previously been by a greater number. A great economy in plant, floor space and motive power is thus effected. Further, the finished material is of much more value, owing to the preservation of the staple and the avoidance of neps and knots. A trough or tray is fixed slightly beyond the vertical plane of the center of the cylinder, and the further edge of the said trough, or the flange of the machine casing in which the said trough slides is slightly higher and at a slightly less radial distance from the center of the cylinder than the edge of the rib on the above-named segment which is next to the trough, this arrangement allowing the most effective action of the trough.

In the drawing, the reference numeral 1 indicates a portion of the large swift, 22 the feed rollers, 3 the usual knife below the feed rollers, the upper wearing face of which knife is preferably formed on a renewable edge piece or bead 4. A metal segment 5 having ribs 6 is secured by brackets 7 to the under-casing of the machine (not shown) and between these ribs 6 are secured lags 8 provided with teeth opposing the teeth on the swift. By this arrangement the toothed lags are prevented from working loose in such manner as to interfere with the proper action of the machine.

The sliding trough or drawer tooth trap 9, which can be drawn out at the side of the machine from its guides 10, has its further side 11 arranged as shown to form a "cliff" against which are thrown loose teeth, broken pieces of lags, pins, screws and other hard materials, which then fall back into the trough.

Claims are granted as follows:

1. In an opening machine, a revoluble toothed cylinder, feed mechanism for supplying material to be treated, a stationary segment arranged below the feed mechanism and provided with ribs, and toothed lags arranged between the said ribs and co-acting with the said cylinder to treat the material fed between them and the cylinder.

2. The combination, with an opening machine constructed as set forth in claim 1, of a removable receptacle for catching hard rubbish discharged with the treated material, said receptacle being arranged at the lower end of the said segment under the said cylinder.

### Apparatus for Dyeing

(1,407,387; February 21, 1922)

WADE H. DAVIS, Walnut Cove, N. C.

This invention appertains to an apparatus for treating yarns with liquid and is particularly designed for bleaching or dyeing. It comprises the particular form of kier illustrated in inventor's generic application Serial No. 178,717, filed July 5, 1917, as illustrated in Figure 1 of that application.

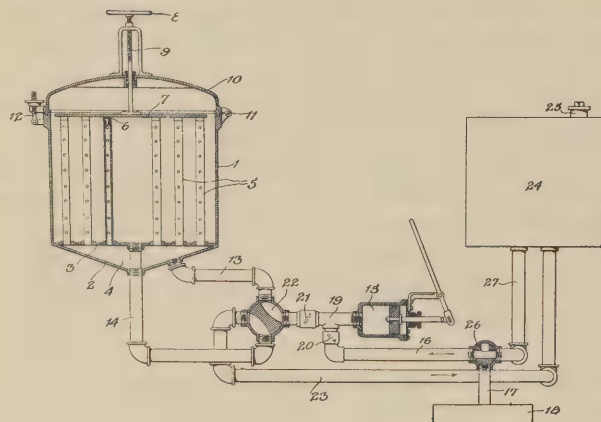
The drawing shows a cross section through the improved apparatus and illustrates partly in section and partly in side elevation the associated mechanism for forcing the treating liquids through the yarn or like fibrous material charged in the kier. (See next page.)

A kier 1, having a conical bottom 2 and a false bottom 3 spaced therefrom forms a chamber 4. Communicating with the chamber 4 by being inserted through the false bottom 3 are holders 5, having perforations or composed of foraminous material whereby liquor introduced into the chamber 4 may be passed up into the holders 5 and expelled therefrom through the perforations or interstices of such spindles.

The holders are preferably closed at their upper ends in any approved manner. As shown in the drawing, the closure is in the form of plugs 6 secured to the holders 5, whereby when such follower 7 is depressed the fibrous material, as for instance yarn, which is wound about the holders 5, may be subjected to pres-



sure to compress the entire mass to substantially uniform density. The compression of the fibrous mass may be accomplished by moving the follower in any approved manner, as by the use of the handwheel 8 and screw 9, said screw having a swivel connection with the follower plate 7.



To carry out the process, it is desirable that the kier be sealed watertight, even to water under pressure and, while this may be accomplished with any usual and ordinary form of mechanism or apparatus, the drawing shows a cover 10, hinged to the kier 11, and with a compression screw 12, whereby a water-tight joint in substantially the usual manner is provided.

Communication with the chamber 4 is provided through a pipe 13, while communication with the interior of the kier 1 is provided through a pipe 14. It is obvious that liquor introduced through the pipe 13 will first fill the chamber 4 and then flow upwardly through the spindles 5 and outwardly through the perforations or interstices into the interior of kier 1 and outwardly through the pipe 14; and reversing the flow, the liquor would be introduced through the pipe 14, filling the interior of the kier 1, flowing inwardly through the perforations of the holders 5 to the chamber 4 and outwardly through the pipe 13.

It is desirable to provide a forced flow of the liquor in either direction as indicated, through the pipes 13 and 14. It is also desirable to first introduce into the kier plain water, preferably hot water, for the purpose of initially wetting, soaking or softening the fibrous material, before the bleaching or dyeing chemicals or pigments are applied. For this purpose, a pump 15 is employed, communicating through the pipes 16 and 17 with a reservoir 18, which may contain clear water or other liquor for the initial wetting or soaking of the fibrous material. The liquor which for this reason may be referred to as "water" is drawn through the pipes 16 and 19 into the pump 15 and, by reason of the interposition of the check-valves 20 and 21, the flow from the pipe 16 is expelled from the pump 15 into the four-way valve 22. With the valves set in the position as shown in the drawings, the flow will be through the pipe 13 into the chamber 4 and in and out through the kier 1, as previously described. When

passing out through the pipe 14, the flow is by reason of the position of the four-way valve 22 directed into the pipe 23 and thence into the tank 24.

The tank 24 is provided with an inlet enclosure 25, whereby dyeing or bleaching material may be introduced into the tank 24, so that as the water flowing outwardly through the pipes 14 and 23 is introduced into tank 24, it takes up and becomes the fluid vehicle for the dyeing or bleaching material contained in the tank 24. When the tank 24 and kier 1 have been filled with water from the reservoir 18 to the desired pressure, which experience indicates as preferably at about 20 pounds per square inch, the three-way valve 26 is moved to the position shown in the drawing, whereby communication with the reservoir 18 is interrupted and communication between the pipes 16 and 27 established. The continued action of the pump 15 will thereafter draw the fluid vehicle from the tank 24 through the pipes 27, 16, 19 and 13 into the kier 1, returning through the pipes 14 and 23. The path of the fluid vehicle as thus established is outwardly through the holders 5 and thus outwardly through the cops of yarn or fibrous material carried upon the holders 5.

For the purpose of uniformity of dyeing or bleaching, it is desirable to reverse the flow of the dyeing or bleaching fluid, which is accomplished by reversing the four-way valve 22, the flow of fluid vehicle being thereby established from the tank 24 through the pipes 27, 16, 19 and 14 to the kier, returning through the pipes 13 and 23 to the tank 24. The four-way valve may be reversed as often as found desirable throughout the cycle of operation, thereby reversing the flow of the fluid vehicle at such intervals as experience and practice demonstrate as desirable.

The development of pressure upon the fluid vehicle tends to force the processing fluid into engagement with all the fibers of the fibrous mass, while the continuous flow and especially the reversal of the flow of the fluid in opposite directions overcomes any tendency of sedimentation or other damaging results due to stagnation of the fluid. It also provides for the wetting or soaking of the fibrous material under pressure and, without opening the kier, the introduction of the dyeing or bleaching material, and the continuing of the process until sufficiently treated.

Claims granted are as follows:

1. In an apparatus for treating yarns and the like with a liquid, a container having an open top, a plurality of yarn holders arranged in parallel relation extending toward said top, said yarn holders being adapted to permit liquid to enter them and to issue therefrom throughout their lengths, a cover for said container, a follower plate having an under surface of an area sufficient to cover the tops of said holders, a threaded rod swiveled to said follower plate and projecting through said cover, a threaded member carried by said cover through which said threaded rod extends, means whereby said threaded rod may be ro-

(Continued on page 277.)

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the  
mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

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No. 8

## PROCEEDINGS OF THE A. A. T. C. C.

**M**EMBERS and other readers are notified that owing to the dearth of meetings during the two-week period elapsing since the preparation of the last issue for the printer, the section devoted to Proceedings of the American Association of Textile Chemists and Colorists has been omitted. It will appear in the April 24 number, and will include the final part of "The Development of Tests for the Fastness of Dyestuffs" (Murray).

Meetings scheduled as we go to press include that of the Council, which will be held Friday, April 14, 1922, at the Engineers Club, Boston, Mass., at 4 P. M.

A meeting of the Research Committee will be held at the same place at 4.30 P. M. of the same day.

The date for the "experience meeting" of the Northern New England Section, announced in the last issue, has been definitely set at 5 P. M. on Saturday, April 22. The subject under discussion will be "Shady Goods," and in this connection the attention of members is called to the reprint on page 259, this issue, of the discussion "Technical and Practical Faults in Wool Dyeing," held by the Huddersfield Section of the Society of Dyers and Colourists, which is given as being of interest to those contemplating taking part in the forthcoming meeting.

## THE PROPOSED EXTENSION OF LICENSING

**A**S compared with its real needs, the present status of the coal-tar dye industry in this country still leaves a very great deal to be desired. As compared, however, with the outlook a year ago, its status has been slightly improved by the action of the Senate Finance Committee in voting, six to four, to recommend the extension for one year from final date of approval, of the present licensing system of protection, and the decision of the committee likewise to recommend the adoption of Senator Smoot's proposal for

duties of 7 cents per pound specific and 50 per cent ad valorem on intermediates, and 7 cents per pound specific and 60 per cent ad valorem on finished products, same to take effect at the expiration of the one-year extension of the licensing system.

In addition, it is expected that in the forthcoming bill there will be provisions authorizing the President by proclamation to increase to the extent of 50 per cent rates of duty when found to be ineffectual in protecting American industries from foreign competition where there is an equality in the matter of labor and raw material costs. The new law will also have a provision dealing with unfair practices in import trade, in much the same way as there is now in the Federal Trade Commission Act a section dealing with unfair practices in domestic trade. With these new provisions of law the interests of the dye manufacturers will at least be better safeguarded than under any of the former tariff acts.

This decision of the committee is admitted to be a compromise, and it must yet be approved by the Senate and again by the special joint conference committee of the Senate and House. At the same time, however, it is understood that this recommendation was not decided upon before the whole matter had been threshed out in private to a sufficient degree to assure the necessary support. It is believed that there will be a safe majority in support of the new measure—safe enough to insure its becoming a part of the Fordney permanent tariff. Since, therefore, the present licensing period, under the Fordney emergency tariff, must continue until a substitute is enacted, and since it is likely to be several months before the permanent tariff is "signed, sealed and delivered," it is the general opinion that the licensing system will be with us for some eighteen months all told before the industry is set adrift in the Smoot lifeboat—which is an open one and scarcely staunch enough to weather the buffeting it will receive from the Cartel.

In eighteen months, however, much can be done. And that something will have to be done is the opinion of the majority of smaller dyestuff manufacturers, whose viewpoint is given in a telegram from Dr. S. Isermann to Chairman McCumber of the Finance Committee. This view is an important one. Dr. Isermann wired as follows:

"Your committee having decided to extend the emergency tariff for one year, in view of the fact that I represent about 50 of the smaller dye and chemical manufacturers from different parts of the country, I immediately got into touch with a number of them.

"The sentiment expressed by most of them, and I am one of them, is that while one year's extension might be helpful to companies with large capital, as they could afford to gamble on future protection, as far as the smaller man who is limited in capital is concerned, he surely will not be placed under such protection in a position to procure additional capital to keep his business going and to further extend and develop the industry.



"Even now he is having trouble because of present conditions. One year's extension is not adequate for his protection. It will give him a chance to liquidate his business, but will not afford the opportunity he must have for development.

"We know it is the intention of the committee and the Congress to preserve the industry in the United States. I also know and we all feel that the committee is not in favor of serving the few large interests and sacrificing the 200 smaller manufacturers of synthetic organic chemicals, but extension for one year will inevitably bring about this result."

In other words, then, those Congressmen who have feared that licensing would cause monopolistic tendencies in the industry if maintained too long, are in reality doing more to encourage a monopoly by shortening than they would by extending it. And it further means that the dye protection question is not to be removed from the realm of politics.

All this is unfortunate. The uncertainty as regards the future is as great as ever. The status of the industry, to be strictly literal, has been "improved." So has the status of a pauper who has just received a quarter for a night's lodging. But he still remains a pauper and the industry still remains without any assurance of a protective period sufficient to enable it to do without special protection after the year, or eighteen months, is ended.

Some will say that the dye industry, as a whole, ought to be grateful for the favor shown it. This reveals a fundamental misconception of the situation. The dye industry is not seeking a "favor" and it is a serious mistake to allow any one to put its request on this basis. It has the same privilege of petitioning Congress for what it conceives to be its peculiar rights as any other industry. This privilege is a part of our American form of Government, which also reserves to Congress the privilege of denying such petitions if in its judgment they ought not to be granted. Theoretically, Congress is a machine, and has no right to become impatient no matter how many times it is asked the same thing—which some seem to forget. Neither Congress nor any one in the dye industry have any right to regard the granting of a legitimate petition as a "favor."

Let us have done, therefore, with the shamefaced attitude occasionally encountered in the trade. The action of the Senate Finance Committee opens up a fresh vista of the same old, never-ending struggle for an American principle. Let the dye industry begin now to renew its campaign for adequate protection until that end is attained.

#### **"IN THE SHADOW OF THE GUNS"**

While the American dye industry is a lusty youngster, it still is more or less in the infant class and deserves all possible encouragement and protection so far as conforms with the anti-monopolistic principles of our Government. One need only hark back to the years of war to realize this.—*Washington (D. C.) Herald.*

#### **THE GOAL OF COAL-TAR CHEMICAL RESEARCH**

THE establishment of the coal-tar dye industry in such industrial countries as the United States and England, necessarily involves a vast amount of preliminary work which is nothing more than a reproduction of results which have already been attained in Germany, and in the effort to meet the requirements of the users of coal-tar colors, the first and principal urge was in the direction of giving them what they had been in the habit of using, the absence of which was making itself felt when the war broke out with disastrous results.

But this, we are reminded by "Dyestuffs," organ of the National Aniline & Chemical Company, should not, however, be the final goal of our chemists, and the mere creation of a coal-tar dye industry which will compare favorably with what was known before the war should not lead to a complacent belief that the situation has been met and provided for.

The organic chemical industry, this publication further points out, is not a completed science. It is in its infancy, and hence the point is altogether well taken that "if the story of William Henry Perkin teaches anything to present-day chemists, it teaches the value and importance of constant and patient research."

That, perhaps, is one of the most important and at the same time least considered reasons why the grievous three-year delay of Congress in acting upon the question of adequate protection for the American coal-tar chemical industries—quite irrespective of the final outcome—has worked such great harm to those industries. The fruits of research are necessarily slow in appearing; it is usually a matter of years before the full benefits are reaped. The investment of capital in research is distinctly an investment in the future. Lack of research is not noticed immediately, but all the same it is constantly militating against advancement and will inevitably show itself in a most startling and disagreeable fashion in the competition of to-morrow. It is more or less analogous to an attempt to make bread without yeast. The substance may be there, but when the real test of its fitness for service to mankind comes, it simply won't stand up for lack of an essential ingredient, and so is a flat failure and an example of much energy expended for—nothing!

Two things are necessary to the success of the coal-tar industry in this country—that is, success as measured by its ability not only to stand up in competition with foreign industries, but to continue its progress past the point already attained by the industry in Mitteleuropa. The first is research of the persistent and thorough kind carried on by Perkin—and subsequently by Germany. The other is a guarantee of adequate protection for a period long enough to permit of that research being realized upon.

And since, as before noted, it takes at least several years for the effects of research to be felt, it is obvious that even the most courageous business men will not

care to invest their money in research which is likely to be cut off untimely by a whim of Congress. Hence, the uncertainty of the past three years has brought research in our coal-tar chemical industries well-nigh to a standstill.

It matters not that the protection which existed at the opening of the controversy has been suffered to endure three years, and that it may possibly be allowed to go on for one year more. On several occasions it has escaped annihilation by only the narrowest of margins, and often at the eleventh hour. It has been this lack of certainty which has prevented the industry from enjoying the progress it might have accomplished. Could the dye makers, in the Spring of 1919, have known that they would be protected from the onslaught of a huge, organized monopoly for four years, the spring of 1923 might have seen them almost at a point where they could discard much of the still necessary governmental restrictions. But they could not know; Congress was too much afraid of political consequences—or of its own inability to tell the truth to certain constituents—to think of doing anything so simple and straightforward, and that is the main reason why it is still, with good cause, being importuned for further extensions of the licensing system or the substitution therefor of a less onerous but equally effective form of embargo.

The work of William Henry Perkin will continue to be an inspiration both to the student of chemistry and the advanced worker. The depths of the coal-tar industries are as yet unplumbed; there is plenty of young blood, intelligence and energy in the country to advance the science to new and, in all probability, unsuspected fields of usefulness to mankind. The schools and universities are ready to train them, and business is ready to finance them.

All they lack is the incentive that comes with the knowledge that this field can provide them with a career—a life work—here in their own country.

#### CAPITALIZE THE SILK SHOW AND SILK WEEK PUBLICITY

REVERTING to the 1923 Silk Exposition, concerning which a reminder was given in these columns in the last issue, it is felt that an additional word or two might not be out of place at the present time, even though the affair will not take place until next February.

Reports now being received by the committees in charge indicate that the entire trade is enthusiastic over the prospect, and this is evidenced in no uncertain fashion by the rapidity with which space is being reserved. Even at this early date, all space on the main floor has been spoken for by last year's exhibitors, with the exception of such areas as were originally allotted to foreign firms; and many of the 1921 exhibitors have this year engaged more space than they before occupied. "The Story of Silk," that colorful pageant so popular at the Exposition last year, will be

repeated, and The REPORTER is glad to note that more space will be used for it, since upon the occasion of its former presentation it was utterly wasted upon many who attended the Show who did not have a chance to see it owing to crowded conditions.

Further, according to the committee, the great interest shown in the first exhibit of raw silk reeling has led to plans for the repetition of this also. D. E. Douty, special commissioner for the organizations promoting the Show, is now in the Orient, where he hopes to secure additional representative firms in China and Japan to exhibit, so that more varieties of reeling may be demonstrated. There will be extensive displays of Chinese and Japanese woven fabrics, Chinese silks of unusual historic interest, and specimens of the famous Japanese Obi silk. In order to impress the full magnitude and splendor of the exhibit upon those with whom he will have to deal, Mr. Douty has with him special films showing scenes from the first Exposition, delegations from China and Japan, and many views and slides in color—a piece of enterprise highly commendable and one which should go far toward bringing about the desired results.

European concerns have also been invited to exhibit, thus making the Exposition thoroughly international in character. It is expected that there will be displays of manufactured articles by French, Italian, Swiss and English manufacturers, and exhibits of reeling by Italian reelers, since space for extensive reeling exhibits has already been reserved by Italian firms.

Still more immediately important, and more in direct line with the present thought, is the fact that although no national or international Silk Week has been decreed by official organizations this year, many individual manufacturers and retail houses are advertising their "annual silk week" for 1922. This cannot but be a source of gratification to those who planned the Silk Week of 1921, since it is evident that the idea has appealed to the public and proved profitable to dealers. It now bids fair to become a permanent institution.

From all of which it may be seen that the Silk Show and Silk Week, together, constitute a very real and powerful force in trade circles, and that interest in them is both alive and widespread. And when you can discover a force of this kind, upon which much money and promotion work is being expended, it remains but to "hitch up" your own "story" to this force in order to reap benefits which could not be secured at several times the cost in any other way.

In the case of the dye and silk industries, the connection is both legitimate and easy to establish.

It would not be a bad plan for American dye manufacturers seriously to consider a little consumer advertising on their own account.

The insurmountable difficulty in the way of this has always been to enable the public, after the so-called "missionary work" has been done, to trace the colors in any fabric back to their source, since it is not, and



is scarcely likely to become, customary for cloth manufacturers to stamp anything about dyes, American or otherwise, on the selvages.

But since much of the glory of the Silk Show is the legitimate property of American dye manufacturers, it would be throwing away an excellent opportunity not to acquaint the public with that fact. It is not the policy of those in charge of the Show to permit the featuring of American dyes in connection with their exhibits, and hence it will not be possible directly to inform the public attending the exhibit. But the two things can be "tied up" in the public mind effectively, and some of the benefits of Silk Week made to affect the dye manufacturers—without, happily, diverting any of them in the slightest degree from the silk people—by means of a little judicious publicity.

It is true that the dye manufacturers cannot "claim everything in sight"—nor need they. But to inform the public at large, through selected consumer mediums, that a generous share of the attractiveness of the displays at Grand Central Palace and in store windows throughout the country is due to their efforts, would be to make legitimate capital of the attention temporarily directed by these events towards the general subject of textiles and colors, and to undo much of the adverse propaganda which is still being circulated as part of the far from mythical "whispering campaign."

It would seem that the opportunity is too good a one to let slip, and at all events it is by no means too early to talk it over quietly.

## Correspondence

### DR. HERTY'S JERSEY CITY ADDRESS

[North Billerica, Mass.,  
March 23, 1922]

To the Editor of The REPORTER:

In your edition of March 13, Dr. Herty publishes a letter sent to him by F. G. Zinsser. I would not have found it worth while answering it if it had not been for a rather personal attack by Mr. Zinsser, Sr. As it stands, allow me to make some corrections.

I do not know Mr. Zinsser, Sr., personally. He was not present at the conversation which took place between Mr. Zinsser, Jr., F. X. Lehmann, Dr. Walch and myself, and therefore I do not quite understand his attitude in this matter; neither do many others.

I will omit for the moment a few slurs, for which Mr. Zinsser, Sr., may claim all the credit.

He says literally, "Dr. Ernster came up here unsolicited. He did not have any conversation with Mr. Lehmann before or after he was in the room with my son, and his statements were made voluntarily, and not as the result of any questions that were put to him." That is a big mistake. Mr. Lehmann invited

Dr. Walch and myself to come up and see him in his office at Zinsser & Co. Furthermore, I had a few moments' talk with Mr. Lehmann before our conversation with Mr. Zinsser, Jr., and after our conversation, Dr. Walch, Mr. Lehmann and myself left together for New York City, and we had a full half hour's conversation before Mr. Lehmann left the train at Ludlow. As for the statements regarding the German business man, I have given sufficient explanation in my two former letters to The AMERICAN DYESTUFF REPORTER. What would Mr. Zinsser have called all this in plain language, if I had made the few assertions just mentioned?

Mr. Zinsser's own words, "Like very many of his countrymen, he may have said these things to make himself important, and there may not be anything in all his various statements," would be easily refuted by a little geographical knowledge. I was a native and citizen of Luxemburg before I became a citizen of the United States. I neither belong by origin or descent to the nation which he probably has in mind. Maybe his own case will give sufficient explanation of this rather vague but cheap statement.

There is no question of veracity between Dr. Ernster, Mr. Zinsser, Jr., and his Sales Manager. Dr. Ernster had his statements substantiated by Dr. Walch, who was an uninterested listener. These points cannot be settled by personal attacks. Those who know the parties interested are able to form their own opinion. Those who don't are very little interested in the subject.

But I will tell Mr. Zinsser, Sr., a secret here. His son tried to turn the conversation, spiked with questions "put to me," into a nice piece of propaganda—through the medium of Dr. Herty—to all of which I would not have objected but for the fact that I did not want to make false and malicious statements about anybody, not even Germans.

It did not work the way they wanted, and that is the reason for all their excitement. As for his gentlemanly language, Mr. Zinsser, Sr., I suppose, will have to take all the responsibility.

DR. NICOLAS ERNSTER.

### FABRIC MADE FROM COCOONS

A British inventor has patented a fabric construction in which silk worm cocoons are packed closely together and kept in place by sewing, gluing or other suitable means. After moistening, the cocoons are flattened and arranged in rows with the edges overlapping, each row being one or several plies thick, as desired. When arranged in this manner they are fixed in position by sewing, gluing or riveting. The product may be varnished and made waterproof. This construction is claimed to give a very light, warm and strong fabric.

## Recent Patents

(Continued from page 272.)

tated, and means for clamping the cover fluid tight upon the container.

2. In an apparatus for treating yarns and the like with a liquid a container having an open top, a plurality of parallel yarn holders fixed within the container and extending toward the top, said yarn holders being constructed to permit circulation of liquid laterally therefrom into the container and in the reverse direction; a cover hinged to said container, means whereby the cover may be clamped in closed position fluid tight, a follower plate carried by said cover adapted to compress the yarn on said holders when the cover is closed, means whereby said follower plate may be pressed into contact with the yarns on said holders, said means comprising a rod connected to the center of the follower plate and extending through said cover, and means for operating the rod from the exterior of said cover to apply pressure to the yarn.

### Vertical Retort for Carbonizing Coal

(1,407,996; February 28, 1922)

WILLIAM TEMPLE GARDNER, Bruern, England (assignor to the Isbell-Porter Company, Newark, N. J.)

This relates to retorts and more especially to that type used for carbonizing coal and has for its primary object to allow for the escape of the products of distillation from over the whole surface of the top of the retort thereby insuring a more efficient and uniform withdrawal of said products of distillation than heretofore accomplished in this class of retorts.

The cross section in plan of a vertical retort is generally oblong and the off-take of volatile products from the mouthpiece of the retort is usually at one end of this oblong. When the major axis of the retort is increased in order to obtain a larger unit the volatile products given off on the side of the retort away from the outlet have to pass across the retort before they reach the outlet.

A more uniform withdrawal of products is secured by this invention, consisting in a construction which allows of escape from over the whole surface of the top of the retort.

Heretofore the mouthpiece has been practically a continuation of the charging hopper and has become filled with coal so that there has been no passage for gas except at that end of the mouthpiece at which the off-take is situated.

By this invention the chamber within the mouthpiece is subdivided by partitions which confine the coal as it leaves the hopper and until it has descended

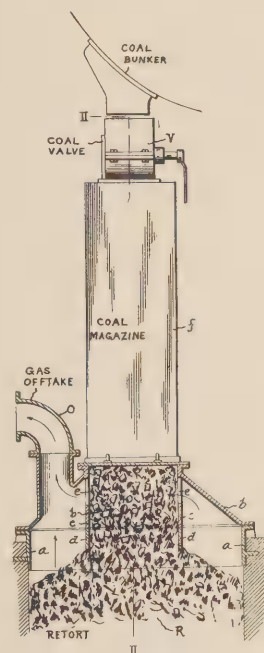
through the mouthpiece, so that there is a free space at each end of the mouthpiece; each partition has an opening at its upper part permitting passage of gas across the coal in the mouthpiece.

The invention consists of structural characteristics and relative arrangements of elements which will be hereinafter more fully described and particularly pointed out in the appended claims.

The drawing shows a longitudinal vertical section.

In the drawing *a*, is the casting constituting the top of the retort and *b* is the casting constituting the mouthpiece. The latter has transverse partitions *c* and these are extended by like partitions *d* in the casting *a*.

Each partition *c* has an opening *e* the shape of which is determined by the angle of repose of the coal on the



inclined bottom of the hopper *f*, the object being to permit the maximum opening while preventing flow of coal through the opening. Thus the coal does not spread laterally into the retort until it has arrived at the lower edge of the partitions *d* and the products can travel up over the whole top surface of the retort. The arrows indicate the flow of products.

Claims are granted as follows:

1. A feeding device for a vertical retort comprising a top section for the retort, a hopper, a mouthpiece having an inclined side and an outlet and interposed between and communicating with said top section and hopper, separated partitions within said mouthpiece and forming a passageway through the mouthpiece from the hopper into the top section, each of said partitions having an opening adjacent to the side of the mouthpiece opposite to its inclined side.

2. A feeding device for a vertical retort comprising a top section for the retort, a hopper having an inclined bottom, a mouthpiece having an outlet and an inclined side forming a continuation of the inclined bottom of said hopper and interposed between and communicating with



said top section and hopper, separated partitions within said mouthpiece and extending into the top section of the retort and forming a passageway through the mouthpiece from the hopper into the top section, each of said partitions having an opening adjacent to the side of the mouthpiece opposite to its inclined side.

### THE PIECE DYEING OF LADIES' DRESS GOODS AND COATINGS WITH ACID COLORS

*(Continued from page 256.)*

out steam, then raise to a boil in one hour and a quarter, adding the bisulphate gradually. From this point on the process is identical with that of a tricotine.

In regard to poplins, great care must be taken during the rinsing. The kettle should be kept filled to the brim until the pieces are cold. Should the water get too low and the pieces happen to be still too warm, the result is mill wrinkles.

One method of dyeing cheaper grades of worsteds which has met with success is as follows: The goods are raised to a boil in one hour and dyed at that temperature for one hour and a half, except for light shades, and then sampled. The pieces are then removed from the kettles while hot and sent to an opener, which spreads the pieces to full width. In the meantime the kettlemen have made the required addition of color and two more pails of Glauber's salt. The pieces are then thrown back into the kettle, the ends sewed together, and the batch brought to the boil and boiled for one-half an hour. At the end of this time a fresh sample is taken, and if the goods are up to shade the boiling is continued for another half-hour, after which the pieces are washed. This method was very effective in correcting any tendency for the formation of rolling selvedges.

### THE DYEING OF LADIES' COATINGS

Velours and broadcloths, for best results, should be tacked face inside. In the case of broadcloths, however, the thread used should be worsted and not cotton, as the latter tends to tear out the selvedge. It is also well to neutralize with ammonia at 120 deg. Fahr. for one-half hour to be sure that the pieces are perfectly clean. Rinse until all ammonia has been washed out.

After adding salt, dyestuff and acid, raise gradually to the boil in one hour and a quarter and boil for one-half hour before sampling. Then treat as if a light-weight fabric. If there should be difficulty in obtaining level dyeings with this method, add but half the color at the start and dye according to the procedure for worsted crepes. With this type of fabric the shade should be kept somewhat lighter for two reasons: First, the shade goes considerably darker during finishing; second, the shade goes darker upon cooling down in the dye bath.

The dyeing of Bolivia cloth and cheviots is very similar

to that of velours, except in the case of tacking. When this is done the pieces are sewed with the face outside. The use of sulphuric acid is not to be recommended, because of the fact that the color goes on the fiber too quickly. It is best to start with acetic acid and add sodium acid sulphate to aid in the exhaustion.

Homespun, wide wales, eponges, zibelines are dyed much the same as dress goods. The kettle should be brought to the boil in one hour and boiled for half an hour before sampling.

### THE DYEING OF COTTON WARP-WORSTED FILLING EFFECTS

As a rule the cotton is dyed in the warp form with sulphur colors for blues, blacks, greens, olives, browns, etc. Red shades are secured by dyeing with primuline and then diazotizing and developing with sodium nitrite and beta-naphthol in the usual manner. Clarets and violets may be produced by dyeing with combinations of primuline and Diazine Black H, with subsequent treatment with nitrite and a developer. In some cases the warp is dyed Aniline Black after it has been woven into the fabric with the worsted filling. Naturally a very fast black is secured.

Usually such fabrics are crabbed in the grease and then sent to the washhouse before being dyed. After the goods are in the kettle, salt, color and acid are added, as was the case with all-worsted piece goods. It is best to use a combination of acetic acid and niter cake even with this type. Bring to a boil in one hour and continue boiling for thirty minutes before sampling. Care should be taken not to boil too long, as at times, depending a great deal on the colors used and method of application, the warp dye tends to bleed. Great care should be taken also to wash out every trace of sulphuric acid during the rinsing, or else a tendering action is apt to set in on the cellulose during drying and subsequent operations.

In case this bleeding alters the shade of the cotton appreciably, it may be corrected by a cold dyeing process. However, this can be done only with full shades. Colors must be used which dye cotton in a cold bath and which do not stain wool. Glauber's salt is used to aid in the exhaustion, together with a small amount of soda ash (say 4 ounces to 200 pounds of material). Use as short a bath as will allow the goods to run over the winch without slipping. Patch every twenty minutes and make additions until up to shade. Rinse with cold water, stopping the machine while water is being added. Then shut off the water, start the machine and pull the plug. When the kettle is empty of water stop the machine and repeat the procedure two or three times. Then add 3 to 4 pounds acetic acid (60 per cent) to the last wash-water and allow the pieces to run ten minutes. Rinse once and remove.

Colors suitable for cold dyeing are: Diamine Fast Yellow AB, Diazine Black H Extra, Erie Brown 3RB, Erie Red 4B, Erie Violet 3R, Newport Direct Yellow G and Erie Green NT.

## SHADING

In shading, the dyer must be especially watchful. In the first place, only the most level dyeing colors should be used, of which the following are good examples: Azo Wool Violet, Patent Blue V and A, Alizarine Sapphirol B, Amido Naphthol Red G, Fast Crimson GR, Fast Light Yellow 3G, Wool Orange GG crystals, Acid Green L and Wool Green S (for navy shades).

The color should be well diluted and well sieved before being added to the kettle. Needless to say, the steam should be turned off. Never under any conditions allow the kettlemen to be careless about this work, and caution them particularly about the danger of allowing the concentrated liquor to strike the pieces. After the color has been added, allow the pieces to run five to ten minutes without steam, depending upon how large a color addition has been made. After that the bath may be raised to a boil. At this point it might be well to remember that single pieces require more color to bring them to the required standard in proportion to their weight than do eight-piece lots, for example.

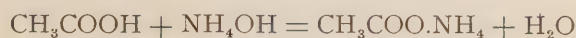
## STRIPPING

All dyers have been brought face to face with the problem of how to treat pieces that are too full or too badly off shade to be corrected by ordinary methods. Generally each problem calls for good judgment. Everything, of course, depends on how badly off shade the batch is. If only slightly full, a further addition of Glauber's salt will often bring about the desired results. If any uncarbonized pieces which are to be dyed black are on hand, several of these may be thrown in the kettle and the boiling continued. The excess of color gradually strips from the full pieces and dyes the roughs, as they are called. This method is very satisfactory for the most part. When the batch has been stripped sufficiently, the roughs may be removed and dyed black without any trouble.

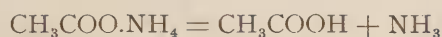
Another method of stripping acid colors is to let out half of the dye bath and then add cold water, together with 20 per cent more Glauber's salts and 1 to 2 per cent of sulphuric acid, depending on the depth of the shade. Raise to a boil and continue boiling for one-half hour before sampling. Often this will bring the shade down a considerable amount; far enough, in fact, so that, with the addition of the proper dyestuffs, the batch may be dyed to standard. Sometimes the entire dye bath is let out of the kettle, fresh water, salt and acid added, and the goods treated as above. If still too full it may be necessary to dye the pieces into a darker and entirely different shade.

Occasionally, however, the batch is so badly off shade that even the methods given fail in their purpose. In that case the dyer naturally thinks of ammonia. However, much depends on the type of the fabric. If the pieces happen to be fine quality worsteds which are to have a

close finish, such as tricotines or Poiret twills, it is often poor judgment to use ammonia, due to the danger of the fibers felting. However, for serges, velours, broadcloths, Bolivias, etc., ammonia may be used without injuring the wool fiber appreciably. Even then it is well to remember that one more step has been added to the sequence of operations and that the wool is hurt accordingly. In no case should the stripping bath go above 120 deg. Fahr. At the end of thirty minutes, patch and wash off. Sometimes the pieces are not washed but acetic acid and Glauber's salt are added to the bath. The bath is then raised to the boil and dyed as before. The chemistry of this is quite simple. It is just another case of double decomposition, the acetic acid reacting with the ammonia in the stripping bath to produce water and ammonium acetate.



The ammonium acetate as the temperature is raised to the boiling point reacts much the same as sodium acid sulphate under similar treatment. Acetic acid is formed, the ammonia passing off in the gaseous state.



Some dyers add niter cake or even sulphuric acid toward the end of the operation to aid in the exhaustion of the bath. This method naturally saves a large amount of dyestuff, although some color additions will probably have to be made in any event.

## REPAIRS AND REDYES

As will always be true, piece goods, for some reason or other, come to the rough perch only to be sent back to the dyehouse because of clouds or streaks. There are so many different reasons why these results may take place, not only in the dyeing process itself but also in operations preliminary and subsequent to the dyeing, that at times the management is often at a loss as to how to determine the exact cause. When such results occur, the cause should, if possible, be determined and corrected against future repetition. This calls for the closest sort of co-operation between the finisher and the dyer, with the superintendent as a third party.

In any case, however, the dyer must determine the future treatment of the damaged pieces. If not too badly streaked, etc., the goods may often be repaired to the same shade. When this is done they are dyed again, the method depending entirely upon the quality of the fabric. During the dyeing, however, a certain amount of color is stripped from the fabric, and to counteract this the dyer, to save time, often adds a proportion of colors to offset this. But at times it is a very difficult thing to determine this stripping effect, especially with mode shades, and consequently one generally may be assured that further color additions will be made later to bring the batch up to standard.



If the pieces which are rejected happen to be dyed a light shade they may often be dyed into a fuller shade, and thus cover up the unevenness. Uneven pieces also may be stripped with ammonia and then redyed; but, as stated before, the fabric itself must be considered.

Where it is impossible to correct cloudiness, etc., pieces may be redyed to a black. The redyeing to black is quite simple, although at times a correction must be made for the previous shade. Reds, for example, must be dyed with a suitable amount of green as well as black. In browns, the yellow must be offset with violet. Generally the bath is brought to a boil in one hour, boiled one hour and a quarter, and then washed off.

[THE END.]

## THE MICROSCOPE: AN IMPORTANT INDUSTRIAL INSTRUMENT IN ANALYSIS, TESTING AND MANUFACTURE

(Continued from page 258.)

### (b) Thickness of Cover Glass, and Tube Length

These are conditions which are not especially noticeable to ordinary microscope users but should be adhered to for securing very best results of corrections in objectives. A normal thickness of 0.18 mm. for cover glass is recommended by the makers. This is known technically as No. 2 thickness. With highest



FIG. XII—Micrograph of a commercial medicine containing emulsified oil,  $\times 675$ . Taken with a  $1/12$ -in. oil immersion objective

Observe the effect upon the eye of the edge portions which are not in clear focus

powers too thick a cover glass prevents a near enough approach of the objective to the object to give any image at all. In conjunction with cover glass thickness the tube length, or distance between objective and

ocular, is important. A standard distance of 160 mm. is advocated as best for visual use.

### (c) Influence of Mounting Medium

The proper choice of material in which to mount the object to be examined is highly important. As a general rule this mounting medium should be perfectly transparent and colorless. It should possess a sufficiently different refractive power on the light as compared to that of the object to give a clear image. Likewise, it should be physically and chemically inert upon glass and object. This is not true, of course, of reagent materials but only of a simple mounting medium. Unless there is a proper difference in refraction the image will be too indistinct to be of service. Physical change of compression or swelling, or chemical action will change the shape and size and not render a true idea of their normal condition. If this unchanged condition is important, then special care must be given to the choice of the mounting medium. Air is used as a mounting medium only with low powers and relatively large objects. With the higher powers, the edges of objects so mounted appear as broad dark spaces and not narrow, sharply defined lines. Color effects are also particularly noticeable. Water, salt solutions, diluted glycerine and oils are often used with objects which are not soluble in these reagents. Solid media like gelatine and Canada balsam, a tree resin, are much used as solid media for mounting. The important effect of the medium is easily shown by trying to examine finely pulverized corn starch when mounted first in air, then in water, and, finally, in 1 per cent gelatine, or in Canada balsam. With air the images of the grains are very unsatisfactory. In Canada balsam they are hard to see, but in water they show very nicely.

### (d) Preliminary Treatment of Object and Care in Preparation of Mount

While in some cases the object needs little or no preparation in fitting it for examination, there are many times when much quicker and more accurate results can be obtained with special treatment of objects. The need for treatment and the kind of treatment vary with the type and condition of material being observed and with the purpose of the examination. Commercial starches many times require pulverizing in a mortar to produce the fine powder in which the individual starch granules are more easily seen.

Cloth is examined with low power and usually needs no treatment. It is simply slipped onto the stage and secured in a flat condition. Yarns and fibers often contain grease and oil. Fibers cannot be studied at very high magnification when mounted in air but, when immersed in a drop of water, very satisfactory images can be obtained. If the fiber contains oil it will not mix with the water and poor results will

be shown in the mount. A preliminary treatment to remove the grease will leave the fibers in a clean condition and easily mounted in water (see Fig. XIII). Light colored yarns containing animal and vegetable fibers, whether carded together, combed or twisted from separate strands, can be examined by immersing in water and noting the characteristics of each kind of fiber, but the process is long and uncertain. If, however, a section of the yarn is warmed with Millon's reagent, on a slide, and covered with a cover glass, then the animal fibers will stand out very prominently as brick red colored fibers and the vegetable fibers will be left uncolored. After this treatment it can be easily seen whether the yarn is carded or twisted, and if carded, the section may be spread out evenly over the slide and the animal and vegetable fibers counted, measured and identified very readily. In this case the difference in color brought about by the preliminary treatment makes subsequent study more rapid and certain.<sup>1</sup>

At times only a particular ingredient of the whole material is desired to be located and identified. With such cases the desired component may be concentrated by using differences in physical or chemical properties. A medical example which illustrates this point very nicely is found in making "blood counts." The number of white corpuscles in a given volume of blood is what is wanted. To detect and count the white corpuscles in the presence of the red cells is a very difficult task. But by treating the blood with acetic acid the red cells are dissolved and removed, leaving the white corpuscles intensified in their microscopical appearance. These corpuscles are then very easily seen and counted.

With the treated object ready for mounting, the observance of care in making the mount often repays for the slight effort expended. The use of a minute quantity helps a great deal. This is thinly spread out, or uniformly distributed over the area of slide to be examined. Thus a drop of thick water suspension of corn starch may yield a field of starch grains so thick as to render no individual grains distinctly visible. The same drop, mounted after much dilution with water and spread out over a large area, will produce a single layer of separated grains, which are well defined in the image. Sealing the cover glass to the slide with a ring of oil reduces the evaporation of the water and, as a result, prevents undesirable movement of the grains.

It is hard to get used to employing micro quantities and to seeing that these are well distributed over the slides, but it pays to do so.

#### (e) Illumination

The character of illumination used has a very marked effect upon the results obtained. Conditions

to be observed in particular are (1) steadiness, (2) brilliancy or intensity, and (3) color value. A flickering or unsteady source of light is excessively tiresome and hard to use. It is, however, easily prevented. The intensity of light employed affects the clearness of vision and the work put upon the eye. With too dim a light, the detail is hard to see and with an excessive amount of light no image at all may be seen, especially if the object is rather transparent. The disturbing effects upon the eye are noticeable at once.

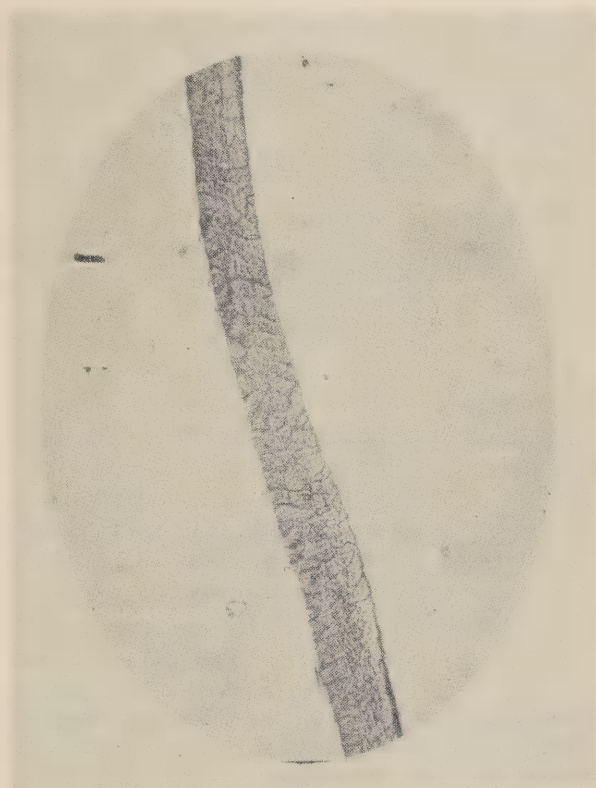


FIG. XIII—Micrograph of wool,  $\times 250$ , showing effects of unclean fiber and of dirty glass surfaces. The material on the fiber helps to obscure the edge. The dirt on glass surfaces show here mainly in the background. Both of these conditions are easily avoided by preliminary cleaning.

When the right intensity is used, the eye feels no discomfort or strain and is able to see clearly defined all parts of the object which are in focus. The intensity is varied by changing the position of the mirror, by moving the light source nearer or further away from the mirror, by raising or lowering the condenser, by opening or closing the diaphragm beneath the stage, etc.

Varying color value of the light changes the ability of the objective to render fine detail distinctly visible. It also has a markedly confusing effect upon the observer. A person used to studying with the aid of daylight reflected from a northern blue sky from a white cloud, or from a white wall, has great difficulty

<sup>1</sup> Millon's reagent is easily prepared by dissolving mercury in its own weight of concentrated nitric acid and then diluting with an equal volume of water.



in identifying the same object when the microscope is illuminated from a bare, carbon filament electric bulb, or by an oil lamp. This change of color value in artificial sources of light from that in reflected daylight, is one of the chief difficulties encountered with artificial illuminants. They are often too rich in yellow and too deficient in blue light. This defect is partially made up through the use of blue glasses or "daylight glass." In Figure XI are shown a few of the types of artificial sources of light, and the blue glasses used to correct their color values. Oil lamps are used with the narrow edge of the wick toward the mirror. Gas mantles, acetylene flames, and "daylight" electric lamps have proved fairly successful as artificial sources of light for visual use.

#### (f) *Care of the Eyes*

There is little if any danger to the eyes and no noticeable strain even with hours of work when a little attention is paid to the use of the eyes, to the regulation of the intensity of light, and to the sharpness of focus. A common cause for strain when using the compound microscope is found in the attempt to keep only one eye open. The squinting of the other eye is very tiresome to the face muscles. It represents a very unnecessary waste of strength, because with a little practice it is much easier to see with both eyes open. Therefore, keeping both eyes open is a wise habit to acquire. Furthermore, if the work is divided by an alternate use of eyes at the eye piece, a good practice is followed.

The observer ordinarily sits facing the source of light. This means that much light reaches the eyes from outside the instrument, and places a double strain upon the eye by presenting light simultaneously from two directions and of different intensities. A judicious use of an eye shade may be made which shields the eyes from this troublesome outside light.

There are times when it seems impossible to get a sharply defined image by focussing. This may be due to unclean optical surfaces, or to an object which is not lying flat enough. It is a natural tendency at such times to endeavor to make up for the lack of sharpness by straining the eye (see Fig. XII). This is unwise and unsuccessful. The eye can never compensate for trouble caused by smears. It is necessary to remove the smear. When the object has portions at different heights each successive portion may be brought into focus by using the focussing apparatus. All focussing should be done with the instrument and not with the eye. If it cannot be so done something is wrong with the instrument or with the object.

#### (g) *Posture*

A comfortable position while using the microscope is just as satisfying and just as important as when using any other instrument. It is well to provide an adjustable stool and a table of such relative heights

that there is no crook produced in the back in trying to squeeze the body down to a lower position, nor any strain felt in the neck in trying to reach up and peek over the top of the instrument. These heights should be such that when the microscope is placed near the edge of the table all it is necessary to do is to incline the head forward. This is especially true when both hands are to be used at the same time in operating the focussing apparatus and in moving the object. The elbows should be able to rest easily upon the table when the hands are not in use.

The actual operation of the microscope is thus seen to be a relatively simple matter, and is easily learned. Regard for a few of the more common causes of trouble—lack of cleanliness, selection of the wrong thickness of cover glass or of an unsuitable mounting medium, or an improper condition of the object—will produce encouraging results and increase the interest in the continued application of the microscope.

*(Part IV, conclusion, will follow in an early issue.)*

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### NEW BLEACHING PROCESS

A process of bleaching vegetable materials, recently patented, is claimed to shorten the ordinary operation, preserve the strength of the fiber and give a satisfactory shade. The inventor, in his description of the process, states that formerly alkaline carbonates, phosphates and silicates, as well as caustic alkalis, were used in the first step of the bleaching process, i. e., the step wherein the material was treated with alkaline solutions at a temperature not exceeding 200 deg. Fahr., in order to wet-out the material and remove part of the coloring matters. These alkalis were also used for making the peroxide bleach bath alkaline. In the new process, alkalis are substituted by suitable lime compounds, of which the most preferable is calcium hydroxide in solution. After having soaked the materials in milk of lime at a temperature from normal to not exceeding 200 deg. Fahr., depending upon the nature of the fiber, to wet out the coloring matter, they are entered in the bleaching bath which is prepared as follows: Ten gallons of 25 per cent vol.  $H_2O_2$  (peroxide of hydrogen) solution are added to eighty gallons of water, previously heated in the mixing tank to a somewhat higher temperature than is required in the application of the bath to the material to be treated. The temperature may vary from normal to not exceeding 200 deg. Fahr. according to the nature of the material undergoing treatment. To the diluted solution thus obtained lime water is added until the bath is brought to the desired degree of alkalinity depending upon the material acted upon and the degree of bleaching desired. The cold additions to the hot water, i. e., the added  $H_2O_2$  solution and the lime water, lower the temperature of the bath to a degree just suitable for its application.

# Italian Dye Industry Faces Strike

Operatives Refuse Wage Reduction Agreed Upon—Manufacturers Welcome Shutdown as Opportunity to Dispose of Accumulated Stocks—Salted Colors Preferred in Some Cases to Concentrated Reparation Dyes—Much "Rubbish," However, Being Worked Off on Old-Time Dyers Lacking Expert Chemical Advice

By RAFFAELE SANSONE

Genoa, March 8.  
Special to The REPORTER.

THE scarcity in the electric current created by reduced water-power continued during the past five weeks, although conditions were somewhat improved on the railways, where electric-train service could be resumed in some cases.

The regain in the value of the Italian lira also continued, bringing the United States dollar from 21.50 lire to 18.50 lire, the English pound sterling from 91.30 lire to 82.50 lire, and the German mark from 0.10 lira to 0.06 lira, causing the quotations of all foreign products to fall in proportion to the damage of the national producers.

The news of an approaching settlement of the financial difficulties caused by the suspension of the payments of the Banca Italiana di Sconto brought with it a partial recovery in the industries that had been deprived for the time being of a portion, or all, of their capital.

## A STRIKE IN VIEW

Following the example of the producers of pharmaceutical products, of the oil works, of the citric acid works, of the tartaric acid works, of the perfume works and of the soap works, the Italian coloring matter indus-

tries would not agree to continue with the same conditions and wages as arranged last November, and insisted on a further reduction in the wages of the operatives, hoping in this way to meet present difficulties the better. The workpeople will not, however, agree to this plan, and there is the danger of a general strike. This strike will afford a certain advantage to the producers of dyestuffs, who will have more time for disposing of their stocks and preparing for a stronger recovery later. For the workpeople the strike would come at a bad moment, owing to the cost of living being still very high, and likewise to the general prevalence of unemployment.

## COLORS ON THE ITALIAN MARKET

The aniline color works suffered further through the strong competition of the colors imported by the Italian Government from Germany on account of war reparation in much larger measure than in 1920, resulting in the accumulation of very large stocks. Besides such colors, there are continually offers of dyes of all concentrations and qualities at prices generally below those of the domestic colors, and many of these find sale even with the large establishments when the chemist and manager of the dyehouse or print works can be satisfied with their qual-

TABLE I

	Feb. 7 to Mar. 7 (lire)	February 7 (dollars)	March 7 (dollars)
Naphthol Yellow .....	50,000— 70,000	2,325—3,255	2,702—3,783
Auramine .....	70,000— 80,000	3,255—3,720	3,783—4,324
Orange II .....	30,000— 35,000	1,395—1,628	1,621—1,891
Nigrosine, water soluble.....	30,000— 40,000	1,395—1,860	1,621—2,162
Nigrosine, soluble in spirits.....	35,000— 40,000	1,628—1,860	1,891—2,162
Sulphur Black .....	7,000— 10,000	325— 564	378— 540
Acid Black .....	35,000— 40,000	1,628—1,860	1,891—2,162
Direct Black .....	35,000— 40,000	1,628—1,860	1,891—2,162
Chrome Black .....	40,000— 45,000	1,860—2,093	2,162—2,432
Methylene Blue .....	80,000—100,000	3,720—4,651	4,324—5,405
Direct Blue .....	25,000— 30,000	1,162—1,395	1,351—1,621
Sulphur Blue .....	45,000— 50,000	2,093—2,325	2,432—2,702
Malachite Green .....	80,000—100,000	3,720—4,651	4,324—5,405
Acid Green .....	60,000— 70,000	2,790—3,255	3,243—3,782
Direct Green .....	50,000— 70,000	2,325—3,255	2,702—3,783
Bismarck Brown .....	40,000— 50,000	1,860—2,325	2,162—2,702
Magenta (Fuchsine) Crystals.....	70,000— 80,000	3,255—3,720	3,783—4,324
Eosine .....	60,000— 80,000	2,790—3,720	3,243—4,324
Ponceaux .....	35,000— 45,000	1,628—2,093	1,891—2,432
Methyl Violet .....	70,000— 80,000	3,255—3,820	3,783—4,324



ity, strength and price. A portion of such dyes are dilutions of the concentrated products with common salt or other cheap diluting agents or means, and the dyers often prefer them to the concentrated reparation colors. Others are, however, little more than mere rubbish, and can only be sold with difficulty; and the seller, who often has been taken in—especially when he has purchased these products as ordinary chemicals from other merchants—has often to wait very long until he can find a small dye works where he can sell his product to some old-fashioned dyer with no chemist to discover its great weakness; it being left to the purchaser to find this out later during dyeing operations on a large scale. Very many such batches of weak dyes found their way into the Italian market during and since the war, owing to the necessity of purchasing colors where they were to be had. Some of the Italian color works have suspended, for such reasons, the construction of new plants, and often find it

more convenient to give their attention to accessory products which offer an easier margin and less complicated manufacturing processes.

#### THE DEMAND FOR COLORS

During the past five weeks, which were favorable for the cotton industry, the demand was stronger for basic colors than for any others. Others in good demand were the sulphur blacks and the direct colors (reds, browns, greens, yellows, violets, etc.). Less in demand were the acid colors—through the prolongation of the crisis in the wool industry—the alizarine colors, paranitraniline or ice colors, etc. For indigo the demand was fair.

#### PRICES OF COAL-TAR DYES

The quotations of war reparation dyes in Table I, per

TABLE II

	— February 7 —		— March 7 —	
	(lire)	(dollars)	(lire)	(dollars)
Acetate of alumina.....	1,600	74	1,600	86
Chrome alum .....	3,000	139	3,000	162
Bichromate of potash.....	6,000	279	6,000	324
Ferrous sulphate .....	500	23	500	27
Copper sulphate .....	2,450	114	2,250	121
Tartar emetic .....	12,000	558	12,000	648
Aniline oil .....	10,000	465	10,000	540
White refined glycerine.....	9,600	446	9,600	518
Glucose, 45 deg. Be.....	3,900	181	3,900	210
Hydrogen peroxide .....	2,100	98	2,100	113
Tannic acid, 60 per cent .....	20,000	930	20,000	1,080
Tartaric acid crystals.....	10,750	500	10,750	581
Acetic acid, 30 per cent.....	2,500	116	3,000	162
Hydrochloric acid, 20-21 deg. Be.....	300	13	300	16
Formic acid .....	11,000	511	11,000	594
Lactic acid, 80 per cent.....	4,000	186	4,000	216
Alum .....	1,000	46	1,000	54
Ammonia, 22 deg. Be.....	1,550	72	1,550	83
Bisulphite of soda, 32 deg. Be.....	400	18	400	21
Chlorate of potash.....	3,500	162	3,300	178
Chloride of ammonia.....	5,000	232	5,000	270
Bleaching powder .....	900	41	900	48
Nitrite of soda.....	3,000	136	3,200	172
Yellow prussiate of potash.....	13,000	604	13,000	702
Yellow prussiate of soda.....	9,000	418	9,000	486
Caustic soda, 70/72.....	2,700	125	2,300	124
Silicate of soda, 140 deg. Tw.....	1,000	46	1,000	54
Sodium sulphide .....	3,250	151	2,500	135
Logwood extract .....	10,000	465	10,000	540
Yellow dextrine .....	3,900	181	3,800	205
White dextrine .....	4,000	186	3,850	208
Farina .....	3,400	158	3,200	172
Kordofan gum .....	4,900	227	4,900	264
Indigo, 25 per cent.....	23,400	1,089	23,400	1,264
Beta-naphthol .....	18,000	837	18,000	972
Industrial castor oil.....	5,000	232	5,000	270

ton in lire and dollars, show the great difference brought about by the lower United States exchange (lire 18.50) prevailing at the moment of writing, in comparison with the February prices.

#### MORDANTS, ASSISTANTS, DYEHOUSE PRODUCTS

The prices of mordants, assistants and dyehouse products suffered little variation; there was a great paucity of caustic soda, and this product was continually offered at the most widely varying prices. In the different imported chemicals, the reduction caused through the lower exchange was noted. Some of the changes in lire and dollars per ton are indicated in Table II.

#### DYE PROBE WITNESSES BECOME MORE DEFINITE AS METZ, HOBBS, THOMPSON AND SCHAMBERG TESTIFY

**Large Consumers Favor Licensing; "No Monopoly," Agrees Metz, but Declares Tariff Sufficient; "Miserably and Damnable Calumny," Says Schamberg of Alleged Charges**

Important testimony which featured the Senate investigation of the dye industry in this country just before this issue went to press was that of Henry B. Thompson, president of the United States Finishing Company, which is a large consumer of dyestuffs. Mr. Thompson is also a member of the Advisory Committee of the Textile Alliance, and chairman of the Dyes Advisory Committee of the War Trade Board, and he testified that as a consumer of dyes he had never observed any evidence of a combination in the dye industry, but on the contrary had found that competition had brought prices steadily downward. He submitted to the investigators a list of seventeen dye manufacturers with whom he regularly did business on an entirely free competitive basis. His company, he stated, used seventeen or eighteen colors, and in the last fifteen months the average reduction in prices had been about 50 per cent. He also refuted the charge of Senator King that he or his concern had benefited in any way through his activities in connection with the War Trade body or the Textile Alliance.

Another extremely important witness was Franklin W. Hobbs, president of the big Arlington Mills, one of the largest dye users in the country, who approved the present licensing system and stated that it should be retained until such time as domestic manufacturers of dyestuffs are able to compete with foreign rivals.

"There are some," he said, "who believe that the dye industry could be protected by a tariff. Personally I do not think a tariff could be written that would do the business, but that is not the point. We know that the plan now in force is workable, and will absolutely protect the industry; so why take chances and make a change?"

A very full statement, including a history of the dye industry in this country, was presented during several

sessions of the hearings by Herman A. Metz, former Congressman and well-known importer and manufacturer. His testimony was partly designed to refute some of the charges that he was acting as an agent for German interests in seeking to import, and was characteristically frank and to the point. He declared himself glad of an opportunity to clear the record. He stated, among other things, that excellence, not natural resources, gave the Germans the monopoly formerly enjoyed by them, and that in acting as intermediary he had accepted the bonds required by Germany only at the suggestion of our own State Department.

He succeeded in creating a diversion and brought forth laughter, in which Francis P. Garvan himself joined, by ironically referring to the latter as "the savior of the dye industry."

Direct testimony of Mr. Metz touched upon his political career, his activities as an importer and manufacturer during the war, and his litigation with the Alien Property Custodian. He also testified that he was an associate member of the Textile Alliance, and had subscribed \$5,000 a year for three years to aid its campaign to clean up alleged graft involved in payments of bribes to purchasing agents of mills.

Taking up the subject of Salvarsan, Mr. Metz said that he was making this product before the war, and is one of the four manufacturers producing it now under license of the Federal Trade Commission. Four or five others have also been licensed by the Chemical Foundation, he said.

In answer to questions from Senator Shortridge, chairman, Mr. Metz said he was in no combination affecting the manufacture of Salvarsan.

Senator Shortridge inquired whether his product was as efficacious as the German Salvarsan. The witness said he was willing to "admit" it was.

Although the American product is as good as, even better than, the German product, Mr. Metz said, many

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#### WANTED

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Wanted—Competent dyestuff laboratory man, capable of taking full charge. State previous experience. Address Box 209, American Dyestuff Reporter, 4109 Woolworth Building, New York City.

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WANTED—Works Chemist. A small dyestuff manufacturing concern wants a works chemist who is willing to get in and help with the actual manufacture. Some knowledge of dyestuff manufacture is desirable, but not essential. Applicant must be physically robust and willing to make himself generally helpful to plant superintendent. Salary will be small to start with, but there is good opportunity for advancement if worth is shown. In reply, give general experience and names of previous employers. Address Box 162, American Dyestuff Reporter, 4109 Woolworth Building, New York City.



doctors and patients want the German product, because they think it better; and they should have it because of psychological reasons. They have been denied the right to import, he said, but agreed "that it is quite clear under the law that they should be."

"I have been criticised by Mr. Garvan for trying to bring it in, although it would cut my own profits," said Mr. Metz, in effect.

Senator Sterling inquired if the witness would apply the same reasoning to dyes as to drugs; that is, if a man wanted German dyes, to let him import them, although they were manufactured here.

"Yes; if he wanted them, let him have them—make him pay for them," replied the witness.

"Make him pay any duty?" asked Senator Shortridge.

"Yes—as high as you want to make it," said the witness.

"It might be suggested that he could go to Germany and get it," suggested Senator Shortridge.

"Then, I think you would lose some of your best dyers," said the witness, in substance; "I think it would work out that they would get the goods dyed in Germany."

Mr. Metz thought the proposal—which at that time had been made—to protect the industry by means of 50 per cent ad valorem and 10 cents per pound specific, based on foreign valuation, adequate.

"Such rates will protect 75 per cent of the dye products," he stated. "I will guarantee to compete with any foreign manufacturer with those rates. The trouble with American manufacturers to-day is they are manufacturing with raw materials purchased when prices were several times what they are now. They are not willing to take their losses on these stocks." Twenty-five per cent of the consumption will be imported, he said.

One point brought out in which the committee seemed particularly interested was included in Mr. Metz's testimony regarding the Dermatological Research Laboratories, of Philadelphia, a concern organized as a non-profit organization for the purpose of manufacturing Salvarsan.

Competition, Mr. Metz said, to which he was subjected because of the activities of this concern, would be manifestly unfair, because while he was forced to pay heavy excess profits taxes, the Philadelphia organization, because of the manner in which it was organized, was not subjected to Federal taxes.

"This organization," he continued, "which has been referred to so many times by Mr. Garvan, because of their altruistic motives, have just voted themselves the profit of their organization to the amount of \$500,000, under the guise that it is to be used for further research work."

"This concern, the Textile Alliance, and organizations in the dye and chemical industry organized as non-profit associations, are, in my mind, unfair competitors, because the manner in which they are organized allows them to escape many of the financial penalties to which manufacturers are subjected," Mr. Metz said.

Asked by Senator Sterling if he had complained to the Revenue Bureau, Mr. Metz replied that he had not, because whenever he made objections the old cry of "German agent" was brought against him, and he therefore thought it best to keep still, and let matters take their course.

Senator Shortridge questioned Mr. Metz concerning competition, and also the matter of a monopoly in the dye industry. Mr. Metz told the committee that there was strong competition, and, because of such competition, he did not believe there was a monopoly now; that if there was it could not be proven, and, finally, that he did not think it really existed, or could exist, with the industry in the condition it is now in.

He intimated, however, that if the opportunity developed under changed conditions, it might be possible for the big concerns to enter into agreements that would lean toward monopolistic conditions.

Chairman Shortridge also asked Mr. Metz the same question he put to all witnesses, namely, what, in his opinion, was necessary to protect the American dye industry?

Mr. Metz said it would be impossible to write a bill that would protect every color. He said, however, that 75 per cent of the industry could, without doubt, be protected by specific and ad valorem duties. A duty of 7 cents per pound and 50 per cent ad valorem on intermediates; and 7 cents per pound and 60 per cent ad valorem on coal tar finished products, the witness testified, would protect the industry, or at least that portion of it which was of consequence to the American manufacturer.

Salvarsan and other products, Metz argued should not be classified along with coal-tar products, but should bear a classification of their own. Mr. Metz, reading from his prepared statement, continued with his discussion of the Chemical Foundation, and the value of the patents taken over.

"Based on Mr. Garvan's statement, these patents do not seem to amount to much," Mr. Metz said, "but on the basis of 5 per cent on the Salvarsan patent, I paid, under Federal Trade Commission license, to the Alien Property Custodian in 1918, \$11,000; in 1919, \$35,000; in 1920, \$51,000; in 1921 over \$37,000. Assuming that during the four years I averaged one-half of the total sold, it would mean that the Salvarsan patents alone had paid to the Alien Property Custodian on 5 per cent of the selling price basis, between \$265,000 and \$270,000."

These points, Mr. Metz told the committee, were brought out by him to show that of the 4,700 patents sold by the Alien Property Custodian to the Chemical Foundation, some were of considerably more value than the \$250,000 for which they were sold.

Mr. Metz also went into the organization of the Textile Alliance. He discussed at some length the matter of reparations dyes, and the work the Alliance was doing. Under a new protocol, he told the com-

mittee, prices were fixed which enabled the Alliance to sell on this side at practically the same figures he had to pay abroad, without duty.

"Eventually," he said, "conditions began to remedy themselves, and taking into consideration the small amount of goods that came here on a reparation basis, and at reparations prices, as compared with the totals that come in sold at the export prices, as compared with the totals that come in sold at the export prices to the Alliance, I, and other importers with better facilities for handling and distributing, can supply the consumers as cheaply, if not cheaper, than the Alliance.

"At the present day, of course," Mr. Metz said, in concluding, "with the awful slump that has come in the textile business, and the enormous amount of goods in the hands of dealers and manufacturers, there could be no effective combination. Everyone is trying to dispose of their stock on hand, and turn it into cash. It has ceased to be banking collateral—goods are being sacrificed, and quotations are made way below cost of production in many cases; and those making them, not realizing that by such quotations they are not increasing consumption, are simply demoralizing the market, and unloading wherever possible.

"I am sure that many plants were either entirely, or at least partly shut down during the past year or two—not because of foreign competition, but simply because they had no knowledge of the extent to which goods could be absorbed in this country, and the slump, which was bound to come, was not figured on.

"The situation, however, will clear up in time. Many of the smaller concerns have gone out of business, and others will continue to go during the coming year or the next.

"The large plants control the intermediates, which the little fellow has got to have. Unless he has a free field, and can import them when they are not obtainable here, it will be an easy matter to be out of stock just the time he wants goods. I have had such cases recently.

"My plants have been held up, waiting for raw materials, because an American manufacturer really had a monopoly, and could not produce sufficient of the product I had in mind, and, while he kept promising deliveries, it would take about six weeks to get them, and, naturally, the customers who wanted the dyes I was making, also had to wait.

"It was not until I applied to the War Trade Board for permission to import some from England, and they took up the question with the manufacturer, that I received a further shipment on account of my orders.

"I don't say that I was deliberately held up, but I do say that this was one instance in which it is shown what can, and will happen, under an embargo and licensing system. With the duty high enough to protect the industry—whether it be ad valorem or specific, and with freedom of importation when supplies are not available here, I have no doubt and no fear that the industry will continue to expand on much safer and

broader lines than it possibly can under any artificial Government restrictions, which would leave it at the mercy of such infants in the industry as those who, in 1919 and 1920, issued those glowing prospectuses to the dear public, offering stocks and bonds for sale."

Dr. J. F. Schamberg, director of the research work of the Dermatological Research Association of Philadelphia, protested vigorously against the testimony relative to his institution given by Mr. Metz, which testimony was to the effect that the institute had presented itself with \$500,000 of profits, made principally in the manufacture of Salvarsan.

Dr. Schamberg said he was at a loss to understand just what Mr. Metz meant by that statement. He said that if Mr. Metz meant that Dr. Schamberg and his associates turned over to an institute incorporated for philanthropic and scientific purposes money which they could legally have retained for themselves, Mr. Metz was correct; but that if he meant that one penny was retained for the personal profit of Dr. Schamberg or his associates, the statement was "a miserable and damnable calumny."

"I challenge Mr. Metz to explain just what he means," said Dr. Schamberg, who said he was constrained to believe that the statement was "a cowardly innuendo, calculated to excite distrust in the minds of the medical profession."

As to the complaint of Mr. Metz that he had to pay taxes on the profits derived from his manufacture of Salvarsan, while the Institute did not, Dr. Schamberg said the essential difference was that the Institute's profits went into further research work for scientific purposes of the benefit of the whole American public, whereas the profits of Mr. Metz went into his own pockets. The altruistic purposes of the Institute were "not comprehensible" to Mr. Metz, Dr. Schamberg said.

The Institute, Dr. Schamberg explained, is a non-profit institution, and the Internal Revenue Commissioner has ruled that it is not taxable under the income tax law.

At the close of Dr. Schamberg's testimony A. C. Vandiver, of counsel for Mr. Metz, asked permission to cross-examine the witness, and it was finally agreed to have Dr. Schamberg return to Washington at a later date, at which time Mr. Vandiver said he would be prepared to cross-examine both Dr. Schamberg and Francis P. Garvan.

#### **BUTTERWORTH-JUDSON CANCELS CONTRACT WITH STANDARD COLOR CO.; WILL MARKET OWN PRODUCTS**

Butterworth-Judson Corporation, manufacturers of acids, intermediates and dyestuffs, has canceled its contract with L. M. Bowes under which Mr. Bowes, doing business as the Standard Color Company, was sole seller of Butterworth-Judson dye products. It is the intention of the Butterworth-Judson Corporation



to market all of its products through its own selling force.

Since April 8 the sales offices of Butterworth-Judson Corporation have been located at 30 Church Street, New York City. The expansion of their sales department necessitated this changing to larger quarters. An announcement of the company's new telephone numbers will be made in due time.

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**NATIONAL ISSUES NEW FUR FELT CARD,  
SPECIAL BULLETIN, AND NATIONAL  
WOOL NAVY B, A NEW NATIONAL  
COLOR**

Recent activities of the National Aniline & Chemical Company in behalf of consumers include a new color card under the title "Mode Shades on Fur Felt," a special bulletin devoted to National Superchrome Garnet Y and National Superchrome Red B, and the marketing of National Wool Navy B.

As part of the service which the company renders to the users of its dyes, systematic attention is paid to the frequent issue of color cards for the various industries in which color is used.

The latest example of this is a color card issued especially for the hat trade, entitled "Mode Shades on Fur Felt," which contains several new features of substantial interest and use to hat manufacturers. It is in the form of a folder, on the first page of which general dyeing directions are given and on which a sample piece of the material used in the subsequent dyed samples is shown. Then follow a series of forty-eight mode shades, and against each one is given the combination of dyes used, indicating the percentages required and the composition of the acid bath employed.

This special hat card will undoubtedly be well received by the fur felt dyeing trade and will be sent promptly from the branch offices of the company upon request.

National Superchrome Garnet Y and National Superchrome Red B are specially recommended for all classes of woolen or worsted goods where fastness to light, washing, fulling, potting or carbonizing is demanded. They are very level-dyeing and penetrate easily, and are fully described, together with methods for applying them, in the company's special bulletin. This contains sample dyeings by the afterchrome method, and also paper samples of Superchrome Red B Lake.

National Wool Navy B is a new Acid Blue especially recommended for the production of bright navy blues on ladies' dress goods with white cotton or artificial silk effects, and on knitting yarns, as it satisfies the light and washing requirements of these classes of material. It also possesses the excellent leveling properties of pre-war Acid Blues of this type.

Samples, together with dyeings accompanied by full working details, will be supplied by the company's nearest branch office.

**DU PONT ANNOUNCES PONTACHROME RED  
B, PONTACHROME BROWN RH CONC.  
AND PONTAMINE FAST SCARLET  
8BS**

Three important new products recently placed upon the market, according to the announcement of the Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., are Pontachrome Red B, Pontachrome Brown RH Conc. and Pontamine Fast Scarlet 8BS.

The general good fastness properties of Pontachrome Red B make it suitable for all varieties of high-grade woolen goods. This product leaves silk effects unstained, and therefore is an important addition to the company's silk white chrome colors for use in men's wear.

Pontachrome Brown RH Conc. is a valuable addition to the company's line of chrome colors, and is particularly noted for its level dyeing properties, like the similar pre-war dyestuff. It is very soluble, exhausts evenly and uniformly, and is therefore suitable for machine dyeing. It is particularly suitable for dyeing by the after-chrome method, although it also dyes well on chrome mordant. Cotton and artificial silk effects are not stained. It may be used also for vigoureux printing.

Pontamine Fast Scarlet 8BS adds to the company's line of direct cotton colors a product which is widely used and preferred because of its brilliancy and reasonably good fastness to acids, light and washing.

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**ATLANTIC ANNOUNCES ATLANTOLE WOOL  
BLUE S**

The Atlantic Dyestuff Company announces the placing on the market of Atlantole Wool Blue S, on which they are in position to make regular deliveries of uniform quality.

This product is an acid color and has the property of dyeing easily, level and satisfactory shades, both as a self-color and in combination, and, for that reason, is especially suited for piece dyeing.

It is fast to light and washing and withstands the action of acids and alkalis, steaming and stoving.

By shading with small quantities of Azo Fuschine or Orange II, very desirable mode shades are obtained.

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A. P. Villa & Bros., Inc., have incorporated for the purpose of dyeing and cleaning silk, cotton and other fabrics, with a capital of \$2,000,000. The incorporators are: Alfonso P. Villa, Brookville, N. Y., Silvio Villa and Charles A. Lorenz.

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The Charlotte Dye Works, Charlotte, N. C., has been chartered, with the principal incorporators being George H. Brockenbrough, Jr., George T. Brockenbrough, Sr., and G. L. Brockenbrough, with an authorized capital of \$125,000. The plant will be maintained and operated in connection with that of the Belbro Mills, which the incorporators of the new firm own, to be run as an auxiliary supply source of dyes used by the mill.

# AMERICAN DYESTUFF REPORTER

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AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

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## FEATURES OF THIS ISSUE

A brief discussion of reduction vat dyes, and their use, is given by Walter E. Hadley.

The concluding instalment of A. K. Johnson's article, "The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture," deals with the procedure for studying various classes of material.

"Things Every Textile Chemist and Colorist Should Know," No. 4, is devoted to "Reclaimed and Extracted Animal Fibers."

Proceedings of the A. A. T. C. C. are again omitted (see note, page 303).

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the Practical Application of Dyestuffs and the Mechanical Equipment Incidental Thereto

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NUMBER 9

## Reduction Vat Dyes, and Their Use

Indigo, the First Reduction Vat Color—Conversion to "Indigo White"—Preparation of Dye Baths—General Handling of Vat Colors—Comparative Fastness Properties

By WALTER E. HADLEY

AT the beginning of the World War, the supply of dyestuffs, which had been constantly coming from Europe, suddenly stopped and the manufacturers of the world, for the first time, realized their utter dependence upon the importation of German dyes for the success of their dyeing industries.

By intensive work, and concentration, it was quite easily possible for the chemists of America to bring forth certain of the simpler dyestuffs, and this was quickly done. There was, however, a class of dyestuffs, known as the reduction vat colors, the manufacture of which required a high type of chemical knowledge and extensive research, and it was some time before these could be produced in paying quantities; but at the present time there are several of the vat colors manufactured in the United States which are fully equal in every respect to the pre-war colors of this type. The line, however, at the present time, is not complete, and much yet remains to be done before a full line of American vat dyes will be available.

### THE FIRST REDUCTION VAT COLOR

The first dyestuff of this class, and one which had been in use for centuries, was Indigo.

Natural Indigo is the product of a plant known botanically as "Indigofera Tinctoria." Up to the year 1897 the world's supply of Indigo was wholly dependent upon the natural product, but during that year an artificial Indigo was introduced which possessed far greater purity than the natural product, and vast quantities of this dyestuff were sold.

A very fine grade of Indigo is now manufactured in this country and finds a ready market.

Indigo possesses a blue color, with a decided coppery hue, and is insoluble in water. By treatment with the proper chemicals, it can be easily converted into a soluble condition and so controlled that it can be readily applied to any type of fiber.

### CONVERSION TO "INDIGO WHITE"

While "Indigo Blue" is insoluble in water, it can be converted into the so-called "Indigo White" by treatment with certain reducing compounds, this latter compound being very soluble.

Many different schemes have been employed in the past, for the production of "Indigo White," notable among which may be mentioned the following: woad vat; soda or german vat; potash vat; urine vat; hydro-sulphite vat; copperas vat; and the zinc vat. All of the above vats are dependent upon the production of nascent hydrogen for the reduction of insoluble "Indigo Blue" to soluble "Indigo White."

The dyeing of the material is brought about by immersing it in the properly reduced "Indigo White" solution, and after a thorough impregnation the material is evenly squeezed and hung up where it can be exposed to the oxygen of the air. When the goods are first removed from the dye bath, they possess a lemon-yellow color, but this quickly changes to a rich and beautiful blue, due to oxidation.

### PREPARATION OF DYE BATHS FOR REDUCTION VAT COLORS

The reduction vat dyestuffs, in general, require the following ingredients in the preparation of the dye bath:

The required dyestuff.

Monopole Oil, or similar product, to aid in the formation of a smooth paste.

Caustic soda to aid in the solution of the dyestuff.

Sodium hydrosulphite (powder) to bring about the reduction of the dyestuff.

Common salt or Glauber's salt is often added to the dye bath to produce better exhaustion of color.

The amount of caustic soda and sodium hydrosulphite



is wholly dependent upon the particular dyestuff being processed, and the correct amount must be determined by experiment. The temperature required in dissolving and reducing the color also varies to a considerable extent.

A great many dyeings produced with vat dyestuffs require a thorough treatment in a boiling soap solution to brighten the shade, and to remove the excess of oxidized color.

#### GENERAL TREATMENT

Certain dyestuffs of the Indigoid Series, when reduced, assume an entirely different color than the original dyestuff, many possessing a pale yellow color. Those dyestuffs derived from anthraquinone, when reduced, are practically the same color as the original dyestuff.

In bringing many of the vat dyes into solution, it is essential that an excess of caustic soda be used, and this must of necessity be thoroughly removed following the dyeing operation. It is often considered desirable to give a treatment in a weak sulphuric acid bath in order to remove the last traces of alkali from the dyed material.

The vat dyes, in general, are noted for their extreme fastness to the ordinary color-destroying agencies, although there are certain well-known instances wherein several of the vat dyestuffs fail to give the required fastness.

The vat dyes derived from anthraquinone possess extraordinary fastness. The sulphide dyestuffs possess very good fastness, while the Indigoid dyestuffs possess the poorest fastness of the series.

The vat dyestuffs are particularly well adapted for the dyeing of cotton material where fastness to water, soap, alkali, acid, and chlorine is required.

The vat dyestuffs find wide usefulness in the production of colored effects in white material. This class of fabric often requires that the white portion be bleached following the dyeing treatment, and the fastness of the vat dye in this particular makes it very desirable.

In textile printing, the use of vat dyestuffs gives a material which possesses great fastness, and is especially valuable in the production of certain types of white goods containing one or more colors.

In dyeing the woolen material with the vat colors, care must be taken that the alkalinity is kept as low as possible.

## **The Microscope: An Important Industrial Instrument in Analysis, Testing and Manufacture**

### **Part IV, Conclusion**

*(Concluded from page 282.)*

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**Studying with the Microscope—General Plan of Procedure—Measuring Microscopic Objects—Varying Angle of Light to Bring Out Special Characteristics—Physical and Chemical Treatment of Object—Interpretation of What Is Seen**

#### STUDYING WITH THE MICROSCOPE

##### *1—General Plan of Procedure*

**W**HEN satisfactory conditions of cleanliness, of lighting and of mounting of the material to be examined have been provided, the task of making the real study is begun. The actual method of procedure naturally depends upon the object and the purpose of the study. It is advisable, as a general rule, to have at hand as much information as may be obtained as to its source, what it is used for, what treatments it has been given, etc. As much further information is secured from careful examination in bulk, and from as many sides as can be done by visual inspection, so that an idea of the material as a whole may be had. In the absence of authentic records or absolute standards for judgment as to the serviceability or quality, etc., of a given material,

much use is made of comparisons of the submitted samples with other samples of known satisfactory nature. One often finds good help in expressing results relatively to these standards. One of the first steps for an Industrial Microscopist to take, therefore, is the securing of representative samples of his materials which may serve as future guides and standards. These standards will, of course, be safeguarded to the limit against undue contamination, mix-up and deterioration. In making the actual comparison under the microscope every effort is made to have all conditions for examination the same in standards and submitted sample.

The problem of what powers of magnification to work with also varies with the object. The larger the object the lower the initial magnification employed may be. It is usually helpful to begin with the lowest power which will show anything of value, and then to work up consecutively to the highest powers neces-

sary to give the desired information. By the use of the lowest power first a broader view of the object is obtained. This attracts the attention to the grosser detail and gives a better idea of the relationship of one part to another. After the study with the lower power is completed it is pushed to a next higher serviceable magnification and the detail of secondary gross character observed. Figs. XV and XVI show the effects of higher magnification. Continuing in this fashion gives correlated information of details which are successively fine in nature. The system put into the study and the correlation of the successive bits of information are valuable features of the plan.

The preliminary use of lower powers has a further advantage of helping to locate more rapidly some particular spot which may be worthy of study. Such spots are easily located with lower powers and can then be placed in the very center of the field. The higher power objective can then be swung in and the study of this area carried on. In no case is it considered advisable to use a higher power of magnification than the problem demands.

An application of this method of study can be easily seen in considering a union fabric made from fine counts yarn and containing a woven pattern. The extent and repeats of the pattern and the style of weave may be studied with a low power magnifier. By picking out and studying each thread in the pattern, with a higher power if necessary, the ply and twist of each thread may be learned. A microchemical test, such as with Millon's reagent, may then be applied to small sections of each yarn and the presence of admixed animal and vegetable fibers determined. The method of mixing is seen as well. Identification of the kinds of fibers in each thread may be carried on as far as possible with powers of 100-400. Only rarely and for very special purposes would a magnification over 500 be

used on whole fibers. This systematic study of the fabric would reveal the kinds of fibers present, the yarns that they are found in and the way they are combined in the yarns. In other words, the given



FIG. XV—Knitted goods  $\times 15$  taken by axial reflected light coupled with transmitted light

fibers are correlated into the proper yarns with certainty, and these yarns are correlated as to their relative occurrence and positions in the warp or filling and in the weave of the fabric.

## 2--Measuring Microscopic Objects

Size is one of the important physical properties of objects which is much used in microscopic study. It may be used in connection with length, breadth, diameter or thickness. Not only actual size but also uniformity in size either in a single particle or among several particles of the same kind is noted as a characteristic with some objects. The application of size is varied. For example, it may be for identification of kind or purity, for learning extent of disintegration or subdivision and in estimation of area or quantity or in comparing machine parts.

There are times when the determination of size is qualitative or relative. It is a mental comparison of the size of objects in one sample with that in another. Where a wide difference in actual size or uniformity in size is characteristic, types of objects may be identified in part, or may be compared, by a mental noting of this difference. It is always necessary in making such mental comparisons, nowever, to make sure of the magnification employed. The unconscious use of

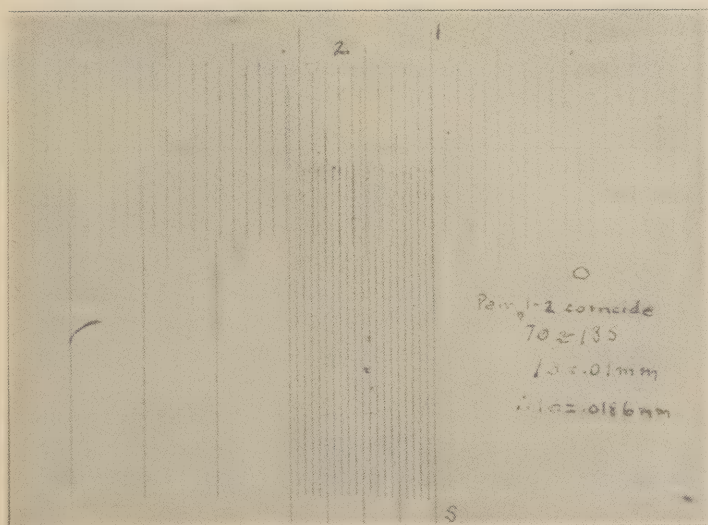


FIG. XIV—Shows relative positions of ocular and stage scales in standardizing. O = ocular scale; S = stage scale



a lower ocular in place of a higher one may throw the examiner entirely off and lead to serious misinterpretation.

In more exact work actual measurements are determined. There are several ways of making measurements. A common and useful method employs a uniformly graduated scale engraved upon a glass disc.



FIG. XVI—Knitted goods at much higher magnification. Illustration is an enlargement of FIG. XV. Note how the detail is much more easily seen.

This disc fits into the eyepiece and is called an ocular "micrometer." While the engraved lines are in reality equidistant and of definite value, this actual value cannot be used in making measurements. This is because the scale is magnified by only a part of the microscope system; namely, the upper ocular lens. It escapes the magnifying effects of the objective and increased tube length, and therefore its magnification for a given eyepiece does not alter with change in objective or tube length, as does that of the object. Thus the ocular micrometer must be standardized or calibrated for every optical combination of objective ocular and tube length with which it is to be employed. Each combination yields a different specific value.

The standardization of the ocular micrometer is accomplished by comparing the ocular disc scale with that of a stage micrometer. The scale of known value on the stage micrometer becomes an "object" and is magnified in true proportion according to the optical conditions used. All that need be done then is to com-

pare the scales of the two micrometers for every change in magnification. The arrangements of the scales in carrying out this operation is shown in Fig. XIV. From this comparison the value of one division on the ocular scale may be computed in decimal portions of a millimeter. The result may be expressed in these decimals or it may be changed to more convenient whole numbers by dividing by 0.001. This 0.001 is the unit of measurement in microscopy and is called a micron (symbol, Greek letter "mu").

The value of one scale division is then given in microns. Table 3 illustrates the variable values which are expressed in both systems. In making actual measurements the object is so placed as to be upon the scale and the number of divisions noted which the object covers. From this the actual size of the object is obtainable. The stage micrometer is of service for measurement in several other ways. The object may be put directly upon the stage micrometer, but such a way is frequently inconvenient. The image of this scale may be projected onto ground glass and measured (as in micrographic work) or upon paper by use of a camera lucida (as in making tracings of objects). Each of these ways is convenient for special purposes.

### 3—Special Characteristics Brought Out by Direction of Applying Light

In studying with the microscope the object itself or details or properties in different parts may be brought

TABLE 3

Showing variation in value of the same ocular disc micrometer with different optical conditions. First column of values expressed in millimeters; second column expressed in microns. 1 micron = 0.001 mm.

Ocular tube length.	.5x160 mm.	10x160 mm.	10x200 mm.	mm.	mic.	mm.	mic.	mm.	mic.
Objective 16 mm.	...	0.019	19	0.015	15	0.013	13		
Objective 4 mm.	...	0.043	43	0.350	350	.....	..		

out by varying the direction of the illumination. The light may be transmitted through the object or reflected by it. Further, the ordinary light rays may be projected parallel to the axis of the microscope ("axial light") or at an angle to it ("oblique light"). The light may also be polarized by sending it through the polarizing apparatus.

Transmitted light is ordinarily employed with minute objects (bacteria, fine particles, minute parts) or transparent sections of objects. Axial transmitted light shows shapes and, to some extent, internal structure. Oblique transmitted light at times intensifies internal structure and may show something of surface condition.

Axial reflected light is used with larger opaque ob-

jects (cloths, metals, papers, rocks), and shows surface appearances only. When oblique, reflected light may intensify surface structure by casting shadows. For special kinds of work there are devices for providing oblique light. A dark ground illuminator uses this principle. The very oblique rays are not visible in the microscope unless some minute particle (colloid or bacterium) intercepts it and reflects it from its surface. The particle is then seen as a white object on a black background. This illuminator is especially useful for motile objects. The ultramicroscopic lighting, employed in examining colloids, is similar except that the light is parallel with the stage. The colloidal particles intercept the light and reflect it upward into the microscope.

Polarized light is used for very special purposes, as in the study of optically active materials (sugars, crystals, fibers). Beautiful and helpful color effects can be obtained under proper conditions. Polarized light at times helps to intensify detail in objects, and in photographic work aids the securing of contrast of object against background.

Each of the various directions of illumination has importance with given kinds of objects. At times, combinations of lighting effects give pleasing results. Fig. XVII was made by oblique reflected light coupled with transmitted axial light. Fig. XV was made by axial reflected light and transmitted axial illumination.

#### 4—Physical and Chemical Treatment of Object

There are many times when much help may be derived in studying an object by giving it a differentiating physical or chemical treatment. This is particularly valuable in studying composition of mixtures. By using (1) proper available temperatures to produce changes in state, as fusion or evaporation; (2) solvents to yield solutions; (3) chemicals or stains to cause differences in color; (4) materials to bring about precipitations—by using some of these the microscopic study may be made more satisfactorily.

It may be necessary at times to look at an object from more than one point of view. Such is the case, for example, with fibers and fabrics. In order to learn internal structure, or shape, or internal condition, or penetration it may be necessary to see the material "edge up." This is, in effect, accomplished by sectioning the fiber or fabric into very thin slices which may be placed "end upward" on the slide. The sectioning of such material is a good bit of microscopy which requires special care and treatment, but it frequently yields results well worth the effort.

#### 5—Interpretation of What Is Seen

After the object has been examined and the facts learned there often remains the question of what the appearances really mean. It is well to keep a few possible sources of error in mind in making a decision as to the real meaning. The possibility of undue change

in the object as a result of previous physical or chemical treatment or of the action of the mounting medium should be kept in mind. The presence of foreign objects (air bubbles, oil drops, dirt, fibers, etc.) in the mount or on the optical surface is also a common cause for misjudgment. If one is examining sections it is well to know the exact plane of the section with respect to one axis of the object, or false impressions may result. The use of a sample which is a representative one is, of course, essential. Moreover, care to keep it so is highly important. The value of not making too hasty a conclusion from the microscopic appearances



FIG. XVII—Knitted goods  $\times 15$ . Taken with oblique reflected light and transmitted axial light. Compare with FIG. XV

is therefore easily seen. Careful methods and cautious interpretation are at times both essential.

The real answer to the question of the significance of what the images show is, naturally, drawn from previous experience. This may lie within the records of a published book, or it may come from a comparison with standard samples which are known to give satisfaction. In original work, experiment and testing may be needed to give the needed information.

#### CONCLUSION

In studying with the microscope, several ways are available for obtaining information—by measurement, by the action of light properly applied, by chemical or physical treatment. The facts are best learned in a correlated manner by beginning with the lower powers and working consecutively to higher magnifications.

Familiarity in the operation of the instrument and of its accessories is rather easily acquired. With its use comes an increased interest in applying it to any of the numerous types of problems for which it is well adapted.

[THE END.]



## Things Every Textile Chemist and Colorist Should Know

[Note—Under this heading is introduced as a more or less regular feature the discussion of certain fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.]

### No. 4

## Reclaimed and Extracted Animal Fibers

### GENERAL CONSIDERATION

**R**ECLAIMED and extracted animal fibers, also designated as "reworked wool," include several types of commercial fibers which have been reclaimed from rags, yarn, or some partly manufactured textile product. Reclaimed wool therefore, consists for the most part of wool fiber in a condition which varies from practically the unchanged virgin wool on the one hand to wool reclaimed from a highly felted fabric, and which may have already been used one or more times.

Three different types of reclaimed wool are recognized in England: Shoddy, Mungo and Extracted wool. They differ chiefly in their source and methods of reclamation. In this country the term "shoddy" is of more general use and practically all types of reclaimed fibers are designated under either the heading of shoddy or wool waste. In order to bring out the specific differences between the different types, however, we will use the English classification mentioned above.

The use of shoddy has in many cases been unjustly condemned owing to the impression that any material containing shoddy is of low grade and undesirable. It is, however, easily demonstrated that it is possible to manufacture a piece of cloth containing as high as 50 per cent of shoddy, and have it when finished a more desirable product to sell at a certain price than a fabric composed entirely of virgin wool. As an illustration, we will assume that a cloth has to be manufactured at a cost of \$2 a yard, and that of this amount \$1 per yard can be spent on the stock which goes into it. If virgin wool was used it would have to be purchased at \$1 a pound. On the other hand, by using 50 per cent of a high-grade shoddy which costs 50 cents a pound, 50 per cent of a \$1.50 wool might be used, thus making the cost of stock the same in either case. In the second case, however, the relatively high percentage of a high-grade wool will add desirable features to the finish and durability of the cloth which might not be obtained by the use of all wool of a lower grade as indicated in the former instance.

It must be remembered that there are all grades of shoddy, some grades being almost as good as new wool, whereas other grades which have perhaps served their purpose several times in cloth, might be completely worn out and of but little value. The use of a too low grade shoddy is not desirable, for it produces a cloth which is tender and which will not give serviceable wear. It should also be remembered that the admixture of too much of cotton with wool is fully as likely to be the cause of an unsatisfactory fabric as the admixture of too much reclaimed wool. If all facts are duly considered shoddy is immediately recognized as a valuable raw material of the textile industry and one the value of which is underestimated from an economical point of view. Furthermore, if it was not for the use of reworked wool, the cost of woollen and worsted goods, particularly the former, would be greatly increased, because the world's supply of virgin wool is not sufficient to satisfy all of the demands, and great economic losses would also be sustained, owing to the throwing away of high-grade wool which could well be used again.

The quantity of reworked wool used in the worsted industry is insignificant and the amount used in the woollen industry is nowhere near as large as is imagined by the public.

In 1914, the fibers used in the entire wool manufacturing industry of the United States, according to the census, was in million pounds:

Scoured wool .....	307.7
Mohair, camel hair, alpaca and vicuna.....	16.0
Other animal hair .....	28.1
Recovered wool fiber .....	70.9
Cotton .....	35.3
Total .....	458.0

### SHODDY

According to the English classification, shoddy is a wool fiber reclaimed from an unfelted cloth. In other words, from knit goods and worsteds. Certain types of wool waste would also come under this heading. In this type the fibers, not having been felted, remain in perfect condition except for slight injuries which might have occurred during the process of manufacture. In many instances the fiber has already been dyed and in the process of reclamation the different colors are separated as far as possible to produce shoddy of distinctive colors. In many other cases the dye is stripped by the use of proper stripping agents and either left in a light shade, or redyed a  
(Concluded on page 311.)

# Cleanliness in the Scouring of Textiles

Lubrication of Wool—Standard Scour on Heavily Oiled Woolens—Materials for Construction of Textile Plant—the Scouring Shed—Model Design for a Rope-Scourer

By JOHN SCHOFIELD, B.Sc.

*From a paper read before the Society of Dyers and Colourists and printed in the "Journal" of the Society*

THE subject of the lecture was divided into two parts: 1. Wool Lubrication and Systems of Scouring; 2. Design of Plant and Materials of Construction.

## THE LUBRICATION OF WOOL

In the main, wool oils constituted the principal "dirt" to be removed by the scourer. There were secondary effects of wool lubrication not commonly appreciated.

The curved surface area of a single wool fiber, 1 inch long, and of a mean diameter of 0.001 inch, considered as a cylinder, was 0.00314 square inch and its volume was 0.000000785 cubic inch. If the specific gravity of air-dried wool substance was taken as 1.33, the weight of this individual fiber was 0.000000038 pound. Therefore the number of such fibers in one pound of wool was over twenty-five millions, and their total surface was approximately 580 square feet. If an oiling for spinning purposes of, say 10 per cent on the weight of the wool was assumed, this meant on each fiber an oil film of, roundly, one-millionth of an inch in thickness. Now, in a teased heap the wool might occupy about one-fiftieth part of the actual heap, the other 98 per cent being air space. It will thus be seen that the problems of penetration, oxidation leading to rancidity, and drying in of the lubricating medium were fundamental to the scouring process.

It was questionable whether the usual method of selling wool oils on the basis of "saponifiable matter" was scientific or even useful. This mode of valuation included neutral oils and fast—i. e., glycerides, etc., as well as fatty acids. But while the latter might be directly saponified in the scouring machines by alkaline carbonates, the former required emulsification by soap in a similar way, though not to the same extent as mineral oils. It was desirable also to specify wool oils on a content of fatty acid. Under these circumstances it was possible, when employing a spinning oil of high percentage in fatty acid, to scour the greasy fabric in alkali (soda ash) alone. This raised the question of standardization in scouring systems, and the following method was put forward as an example.

## STANDARD SCOUR ON HEAVILY OILED WOOLENS

In these cases the alkali would usually be piped onto the machines. If a gauged tank was provided and a 60

to 70 deg. Tw. solution at about 100 deg. Fahr. has been made up, then a total quantity of, say, 20 gallons for each piece in the machine was run in; the drive was started up concurrently so as to distribute the alkali evenly over all the set, and the pieces were pulled forward by hand for one or two minutes to assist the grip of the rollers. If the spinning oil was of the proper quality in free fatty acid content, saponification and emulsification would commence immediately and a dirty lather would form in the machine. This was the first stage of cleansing, and consisted wholly of attack on the superficial oil, flock and general dirt adhering to the fiber. In 5, 10 or 15 minutes this would rise in the machine, and the pieces might then show signs of slipping on the rollers through want of frictional grip in the oily scour. At the first indication of this slowing down of slipping, the sud-box was opened to the drain and this emulsion run off without any use of water. When the machine was almost free from this first lather, the shuttle was closed, 5 to 10 gallons more alkali per piece were added, and the scouring continued. It might be necessary in some cases to run a second lather off, or in extreme cases a third. But no scruples should be entertained regarding supposed waste of scouring liquors; emulsification was proceeding, the dirt was being detached, and no object was served by its retention in the machine beyond a limit indicated by its rise to inconvenient proportions. Alkali (soda ash) was the cheapest of detergents; it was, approximately, one-tenth of the cost of the same weight of soap, and in the above described operation was a superior detergent.

This system might be described as "multiple scouring"; it was based on the following principles:

1. Attack by alkali alone on the free fatty acids of the spinning lubricants with emulsification thereof.
2. The resulting emulsification detaching the superficial dirt from the fiber, and its early removal from the neighborhood of the fabric.
3. The use of a clean and unexhausted scour of good diffusability for the deeper penetrated dirt, which required longer continued action for its saponification and emulsification.

The practical advantages were many: Cheapness by economy of soap; little color bleeding, as the temperature and concentration of alkali were moderate, and the scour was fairly clean for the greater part of the run; softness and handle were conserved by the same conditions.



In from one-half to three-quarters of an hour, the scour would be completed, and the stage of diluting the emulsion might be commenced. Water at about 100 deg. Fahr. should be added slowly, allowing the lather to rise nearly to the sud-box. The shuttle might then be opened, the water—still warm—put on more strongly, and the emulsion run from the machine, continuing until the pieces were perfectly clean. If then the milling process was to follow, they might be "lathered up" by the addition of the proper quantity of soap, and run, say, for fifteen minutes to secure even permeation by the soap. If for dyeing, or to be dried out, the washing off water must be gradually cooled down to final cold water.

The above might be looked upon as a standard system of scouring, applicable to the dirtiest goods. Worsteds did not usually require so drastic a treatment, as the oiling of worsted yarns was very different. A worsted scour might consist of alkali of weaker concentration—down to 2 to 4 deg. Tw.—with some soap, added from the outset. Many worsteds were scoured in cold liquors. The so-called low worsteds—of cotton warps and woolen weft, this latter often recovered wools with low-grade oiling—were best scoured on the multiple system; they constituted one of the scourer's worst problems. Apart from the difficulties inherent in inferior materials, there was the special trouble introduced by the sizing, which might have been overdried and rendered almost insoluble. It was possible that there was a mordanting effect on the gelatine of animal sizes by the chrome or iron of the dyeing process, leading to perfect insolubility; the point required further inquiry. The users of sizings were, as a rule, somewhat reserved in disclosing the chemical nature of their mixtures to a scourer struggling to eliminate them from the fabric. In addition, these low-worsted cloths with abundant cotton were peculiarly liable to develop streaks and patches by surface friction due to worn rollers, tightening up, etc.

#### MATERIALS OF CONSTRUCTION OF TEXTILE PLANT

The scouring and milling of textile fabrics, like all chemical arts, had to face the problems of corrosion in a more than ordinary degree. Hence the question of materials for the construction of textile plant needed special attention.

##### *Iron*

The non-rusting iron adapted for general practice had yet to be discovered. Iron-rust stains were exceedingly frequent, perhaps the commonest of all, on textile fabrics. All iron-work should, as far as possible, be carried outside the machine. Much framework now done in cast iron would be better in mild-steel sections, with advantages in strength and lightness. The use of ball and roller bearings, which might be enclosed and filled with grease, was advisable in certain cases.

##### *Copper*

This metal and brass (70 per cent copper, 30 per cent zinc) were practically as objectionable as iron from the staining point of view; fatty acids in oils or soaps formed green copper oleates, etc. The copper pipes in scouring machines, the brass flanges of wringers and milling machines, the perforated copper cages in some laundry-type washers and in hydro-extractors, not to speak of copper vessels and such appliances in dyehouses, were all liable to cause trouble if neglected or employed under wrong conditions.

##### *Lead*

The conditions of the scouring shed usually permitted only of the employment of lead as protective covering; it was mechanically weak. While it withstood sulphuric acid well, it was open to attack by alkalis and by bleaching chemicals. The lead flashing usual as a cover for centrifugal hydro-extractors should be covered by a wooden ring; lead was soft enough to rub with coarse wools if in direct contact.

##### *Aluminum*

This was a metal of which far too little use had been made in textile plant. It was little acted upon by dilute solutions of the common acids or alkalis or the fatty acids, and even when slightly corroded, its salts were nearly all white. Its specific gravity was 2.6, and parts made of it were usually lighter even when bulkier than corresponding details in other metals. Its tensile strength was low—6 tons per square inch—but it might often be used in sufficient thickness to compensate for this. It was generally cheaper, part for part, than copper or brass. One of its greatest defects was its softness, which rendered it unsuitable for parts involving mechanical wear. The author had successfully substituted an aluminum for a copper perforated roller on the blowing machine, with great advantages to the cleanliness of the wrappers and of the pieces, and also in replacements. An interesting example of the properties of aluminum occurred in its high specific heat (.2) for its specific gravity (2.6); iron had a specific heat of 0.11, and specific gravity 7.7. If ever the price of aluminum became comparable to that of iron, press plates could be made of the former metal to give the same amount of heat with little more than one-third the weight.

##### *Wood*

Only a few woods—birch, beech, poplar, and sycamore—were really suitable for parts of machines with which fabrics came in contact, particularly rollers, edges of tanks, spouts and mouthpieces of milling machines, and the like. Most woods of the pine class, deals, etc., contained resin; and a large number of the non-resinous woods, such as oak, contained tannin. Regard must be

paid to the special objects for which the appliance was intended—e. g., pitchpine, one of the most resinous of woods, was very suitable for some tanks where alkalis or soaps did not enter into the question. It must be remembered that most woods resisted dilute acids exceedingly well, but alkaline solutions extracted tannins, resins, etc., from many.

Machine rollers were very important throughout the dyeing, scouring and milling departments. Soft woods were unsuitable, water and liquors soon destroying their surface. The best woods were beech and sycamore, naturally seasoned, and free from defects, knot-holes, bark-scars, etc.; sooner or later caused trouble by decay, leading to mysterious stains. Rollers must be maintained during use in an even, level, and smooth condition; this was best done by turning up in position by a slide fixed across the machine; on this a toolholder, fed by a screw, carried the turning tool—i. e., an extemporized lathe bed. The end grain of rollers was the most troublesome to protect from decay. Painting with the common lead paints was unsatisfactory, as the alkaline liquors soon stripped this covering. Some attempts at creosoting the ends had been made, with but little success. In one experiment the rollers were set on end and paraffin wax melted into the grain by heated flatirons, assisted by a plumber's blowlamp. Flanging with aluminum sheets up to a couple of inches from the circumference would be a good method of protection. Rollers were commonly made longer than necessary; this was waste of valuable timber, and prevented access between their ends and the sides of the machine for cleaning purposes. They were also usually heavier than was required; if more attention were paid to the scour, weight might be saved in the rollers, or the pressure obtained in other ways.

#### THE SCOURING SHED

The layout of plant in a scouring and milling shed should be carefully considered, the general principle being that machines should follow each other in the order in which the treatments were given. The floor of the shed should slope slightly—say, 1 inch in 2 feet—so as to be self-draining and automatically self-cleansing. There should be plenty of room at the back of the machines; more was learned from the rush of the scour at the draftboard and rollers than from the open front. Tanks for alkali and soap, and filters for water, might be placed along the back, and pipe-runs should be shortened to a minimum. The shafts should be at the back. Steam and water pipes were usually laid overhead; it was debatable whether they would not be better carried in a shallow channel at or near ground level. Drains should slope steeply, to free themselves from flock; the grids of the seak-boxes were best made of perforated aluminum sheet; this looked clean and showed up dirty accumulations, and zinc was too easily corroded. The roofs should be of the saw-tooth pattern, one side glass; the scouring shed should be at least as well lighted by natural lighting as the spinning rooms. The running of a steampipe close up to the roof to prevent condensation had proved useful.

#### A MODEL DESIGN FOR A ROPE-SCOURER

In the light of the foregoing considerations, the design of a rope-scouring machine fitted with all detail improvements necessary for clean and high-class working would now be considered.

The framework was usually of cast iron; in these days of cheap and rapid welding by acetylene, etc., a triangulated frame of mild steel of suitable angle and channel sections would probably be equally cheap and much stronger. The trough and sides must be of wood; bad knots, etc., must be drilled out and the holes plugged up. The rollers, say, of beech, the lower of smaller diameter. The boardwork might be fastened to the frame by aluminum bolts, in place of the usual wooden pins—or worse, iron bolts—as in this machine there must be no corrodible metal in the interior. The shafts of all rollers should be sleeved in aluminum set into the end grain a little, and carried to the outside of the frame; all bearings should be external, and arranged to drip clear of the inside wall of the machine. The top of the machine frame should be split into halves for easy removal and replacement of rollers. The bottom of the machine should not be quite a symmetrical curve; the lowest point should be nearer the front of the machine, to form a pool, into which the squeezed folds of the fabric dropped as soon as possible and saturated again. The sud-box might be of the ordinary design with holes in the base, and slide-block opening and covering these. It should, however, be made double-bottomed, and the lower board brought forward say 6 inches, to spill the squeezed-out scour from the rollers onto the falling pieces much sooner than was ordinarily the case. In general practice it was probable that 50 yards out of 60 yards of a piece lay for the greater part of a revolution in the squeezed-out semi-dry state in which they have come from the rollers. This was not scouring; the pieces in the ideal scouring operation were either being squeezed or being soaked through and through, and the sooner the rewetting followed the roller action the better.

The best position for the sprinkler pipe for the supply of hot or cold water for washing-off was a debatable point. English practice favored positions either in front of the sud-box or lying along the front wall of the machine; in Germany it was usually placed behind the rollers and just above the draftboard. The best place was probably along the front of the machine. A copper pipe was general, but aluminum would be better. The perforations were usually too few and too coarse; two rows—half an inch apart—of one-eighth inch holes pitched half an inch, was a very suitable arrangement. The washing-off water did not require to be delivered under more than a 5-foot or 6-foot head. A soft packing of Ruberoid, treated felt, or similar material, should be placed between the frame and the boards to prevent rust-creeping by capillary attraction.

In such a machine, maintained in good order, fabrics of the highest standard of cleanliness might be regularly turned out.



# Organic Acids Used in the Treatment of Textile Fabrics

Effect of Chrome and Acid—Available Acids—Acetic Acid—Oxalic Acid—Tartaric Acid—Citric Acid—Formic and Lactic Acids—Still Cheaper Production Needed

By A. J. HALL, B.Sc.

**M**ORE than in the past there is now a greater tendency to pay attention to the durability of fabrics. The dyer's task does not consist merely of dyeing fabrics to shade, but of doing this and conserving their strength at the same time. When one considers the operations which are involved in bleaching, dyeing, printing and finishing, it becomes apparent that the opportunities for a fabric to become weakened are extremely numerous

## EFFECT OF CHROME AND ACID

The behavior of German soldiers' uniforms during the war led to considerable controversy among those responsible for dyeing them. In particular, the effect of chroming on wool was discussed, and although the evidence was somewhat inconclusive as regards the relative durability of chromed and unchromed wool the importance of a fabric's durability became very apparent. Since then several investigations have been carried out with the object of determining the treatments incidental to bleaching and dyeing liable to cause a fabric to deteriorate appreciably. Undoubtedly, acid treatments are very dangerous in this respect. In the production of colored and even white fabrics, it is impossible to avoid subjecting them to acid treatment and therefore the relative effects of the various acids in use becomes of interest. At present acids are broadly divided into two classes—mineral and organic acids. Mineral acids are not only simpler in constitution, but, as is generally known, they are many times stronger than the average organic acid. At the same time, organic acids are usually dearer than the mineral acids, and largely for this reason—the latter are the more extensively used. Since the mineral acids can cause so considerable a decrease in the durability of a fabric, their use should be avoided wherever possible. And there are many processes where formic, oxalic, acetic and other organic acids can take the place of hydrochloric and sulphuric acids.

## AVAILABLE ACIDS

At present organic acids of the benzene and naphthalene series find little use in the treatment of textiles. Moreover, it is not likely that they will ever find technical application, for although the objection due to their high cost might be overcome in the future, the ease with which

they form colored compounds by oxidation or in contact with metals renders them unsuitable. On the other hand, acids of the aliphatic series, such as acetic and formic acid, are free from these disadvantages and are largely used. In addition to those acids now available there is quite a reasonable possibility that other organic acids will at some time become commercially available. Quite recently, in fact, it has been shown that maleic and fumaric acids can be made by the controlled decomposition of benzene, and that these acids can be used in printing and dyeing. Thus they are useful for chroming wool and the dyeings subsequently obtained possess a good fastness to rubbing, washing and light. They can replace oxalic acid in printing processes and are suitable for use in the dyeing of silk.

It is possible that at some time the various sugar acids may be used in dyeing, for they could be produced cheaply. But at the present time the number of organic acids in use for textile purposes is strictly limited, and it is the purpose of this article to review them briefly.

Acetic acid is perhaps the oldest of the organic acids used for dyeing purposes. It is one of the weakest. In dilute solution—vinegar—it is produced by the aerial oxidation of weak alcoholic liquors. But the acetic acid known to the dyer is never obtained in this manner. It is always obtained as a by-product in the destructive distillation of wood.

When wood is carbonized it yields nearly 50 per cent of a distillate known as crude pyroligneous acid, and this contains 7 per cent of acetic acid and smaller amounts of methyl alcohol, acetone and other impurities. It is the practice to add lime to this crude pyroligneous acid and redistil it, whereby the volatile substances pass over to the condenser, while calcium acetate remains in the still. This residue is subsequently acidified with 95 per cent sulphuric acid, so that on distillation the acetic acid is obtained moderately pure in the distillate, which on redistillation yields pure acetic acid. For the production of glacial acetic acid it is necessary in the distillation to use an efficient rectifying column.

## ACETIC ACID

When fabrics are treated with acetic acid their deterioration is but very small. This acid, therefore, finds many uses where the stronger mineral acids can-

not be used. Thus sulphur dyes are decomposed when treated with hot hydrochloric or sulphuric acids, so that in the aftertreatment of sulphur-dyed fabrics to increase their fastness to light and washing it is preferable to use a mixture containing 2 per cent of sodium bichromate and acetic acid rather than one containing sulphuric acid. The same consideration holds in the dyeing of wool-cotton union fabrics with sulphur dyes. For the purpose of obtaining shot effects the cotton may be first dyed with a sulphur color and the wool be subsequently dyed with an acid wool dye. In this case the wool should be dyed from a bath acidified with acetic rather than sulphuric acid.

The addition of acetic acid to the dye liquor is often advisable in cases of dyeing with basic colors which show a tendency to rush onto the fabric. Uneven dyeings may thus be avoided.

In aniline black dyeing, acetic acid can replace a portion of the hydrochloric acid which is used. The exact proportion is dependent on the particular process followed, but it can always be determined by experiment. Aniline black liquors containing acetic acid have less tendering effect than those which contain mineral acids alone.

#### OXALIC ACID

Another useful organic acid is oxalic acid. This differs from acetic acid in being stronger and dibasic. Nevertheless, its tendering effect on textile fabrics is comparatively small.

Oxalic acid is usually made by the alkaline fusion of waste wood—sawdust—or by decomposing sodium formate. It usually occurs in commerce in the form of crystals having the composition indicated by the formula  $C_2H_2O_4 \cdot 2H_2O$ .

It can be used with advantage in the chroming of wool. About 2 per cent of sodium bichromate and 2 per cent of oxalic acid should be added to the chroming liquor.

In the form of a double salt—the oxalate of potassium and antimony  $K_3Sb(C_2O_4)_3 \cdot 4H_2O$ —oxalic acid enables a cheap substitute for tartar emetic to be produced. This complex substance can be used for fixing fabrics mordanted with tannic acid.

In printing many discharge processes require the presence of an acid, and oxalic acid is a very suitable acid to use for such purposes.

Perhaps, however, tartaric acid is employed more largely than oxalic acid. It is almost entirely made from argol, a crust which forms on the sides of the vats used in the fermentation of grape juice for the production of wine. Argol itself is impure potassium hydrogen tartrate—which in the pure form is known as cream of tartar.

It is usual to treat the argol with chalk so as to obtain calcium tartrate, which being very sparingly soluble in boiling water can be easily separated in a pure state. The calcium tartrate is then carefully treated

with the correct amount of sulphuric acid, and then the liquid is filtered from the insoluble calcium sulphate so formed. The clear solution then obtained is concentrated and then allowed to cool, whereby the tartaric acid separates as anhydrous crystals.

#### TARTARIC ACID

The most important salt of tartaric acid is tartar emetic—potassium antimony tartrate  $K(SbO)C_4H_4O_6 \cdot \frac{1}{2}H_2O$ . It is one of the best agents for fixing tanned cotton. Cream of tartar is very suitable in conjunction with sodium bichromate for chroming wool, since it has a definite reducing action. About 1 to 3 per cent of each substance should be used. It also exerts a favorable influence when added to solutions of aluminium salts which are being used for the mordanting of wool.

Tartaric acid itself, however, is very widely used in printing, and in many processes oxalic and tartaric acids are used together.

#### CITRIC ACID

The remaining vegetable acid commonly used by dyers is citric acid. It is almost wholly obtained from lemons and limes, and its manufacture is very largely carried out in the British West Indies and in Italy. These fruits are usually expressed and the juice so obtained is then concentrated and exported as such or after first being converted into calcium citrate—a substance which is more easily handled. The pure acid can afterwards be very easily made from the citrate.

In its properties citric acid very closely resembles tartaric acid. It is, however, tribasic, and can therefore form three series of salts. Citric acid is very useful for the discharging of iron, aluminium and chrome mordants, and thus serves a useful purpose in the printing of madder styles. For many purposes in printing, either of oxalic, tartaric and citric acids can be used to replace the other. And in those cases where such a choice is possible it should be remembered that citric acid has the least and oxalic acid the greatest deteriorating action on fabrics.

#### FORMIC AND LACTIC ACIDS

Two other useful acids are formic and lactic acids, and both of these are steadily coming into favor among textile workers. Formic acid, of course, is much stronger than lactic and acetic acids, but nevertheless it can be dried into fabric without causing appreciable deterioration in strength. The properties of this acid have been dealt with in a previous article (this journal, November 15, 1921), but it is here pointed out that formic acid is especially suitable for use in the chrome mordanting of wool, since not only is the chrome bath more thoroughly exhausted but the wool



is deteriorated by only one-quarter the extent which occurs when sulphuric acid is used.

The present increasing use of lactic acids and its salts illustrates how thorough is the search of chemists for non-corrosive acids. For not one of the processes by which lactic acid can be prepared is simple. They all have difficulties which render them expensive. Yet in spite of this lactic acid is now commercially available.

As is generally known lactic acid is present in sour milk and its presence there is due to bacterial fermentation of the sugar and nitrogenous matters contained by the milk. On the large scale, however, sugar forms the raw material from which the acid is made.

Many methods of conducting the fermentation have been devised with the object of obtaining the greatest yield of acid. In one process, however, a 10 per cent solution containing cane sugar and glucose is first sterilized by maintaining it for about one hour at 95 deg. Cent. By this means all foreign bacteria which would in a later part of the process give rise to acids other than lactic acid are thus destroyed. The solution, which must not be acid, but either neutral or alkaline, is then cooled, and to it is then added a suitable culture of a lactic acid ferment. From time to time chalk must be added to the fermenting liquid. Otherwise the acidity of the solution, due to the steady formation of lactic acid, would seriously retard fermentation.

After a few days, when the process is complete, the resulting solution contains calcium lactate and insol-

uble organic bodies. It is then filtered (calcium lactate is soluble in water) and the clear solution treated with sulphuric acid. In this manner insoluble calcium sulphate and the free lactic acid are formed, and after filtration the acid solution can be concentrated to the desired strength.

Lactic acid has the composition indicated by the formula  $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$ .

Lactic acid can very advantageously be used in the chroming of wool and the luster and soft handle of this fiber are not materially diminished in the treatment. Lactates of potassium and antimony also find use as substitutes for tartar emetic. The acid can also be employed in various discharge processes in printing and is suitable for use in aniline black dyeing. It is only the high price of lactic acid which limits its application in processes of textile treatment.

#### CHEAPER PRODUCTION NEEDED

It is thus seen that there are several organic acids which are available for purposes of textile treatment. They have the advantage of causing a much smaller injury to fabrics than the commonly used mineral acids, but owing to their comparatively high price they are used less extensively than they otherwise would be. It remains for manufacturers to produce these acids more cheaply so that they could be more generally used. Then dyers and printers would be able to produce more durable fabrics than is possible at present. —"Dyer & Calico Printer."

## The Control of Chlorine in the Bleaching of Cotton Goods

Advantages of Chlorine-Soda Chemic—Early Batch Mixing Practice with Chlorine—Excess of Alkali Required—Preparation of Neutral Chemic—Flexibility of Operation—Bleaching Installation—Savings by Use of Apparatus

By C. M. EDWARD SCHROEDER

**S**INCE liquid chlorine became available on the American market in convenient form for handling, the preparation of bleaching liquors of superior quality and uniform composition at once established an improvement which rapidly superseded the more cumbersome and uncertain production of bleach liquors from chloride of lime or bleaching powder. Prior to the introduction of liquid chlorine there had been no material change in the process of cotton bleaching for many years, but the preparation of sodium hypochlorite bleaching liquor or chemic with chlorine constituted an improvement of great practical value.

The immediate advantages, aside from cleanliness and ease of handling, derived from using chlorine-

soda chemic over the old chloride of lime or bleaching-powder solutions are twofold: (1) Chlorine-soda chemic can be made up under constant control of bleaching strength, in clear liquors, ready for immediate use. (Chloride of lime losing strength on exposure, and depositing sludge in making up.) (2) There being no lime salts present as in the chloride of lime chemic, goods will not be in danger of tendering or discoloration, and for the same reason goods for dyeing will not show unevenness from lime residues.

During the writer's experience of about ten years past in the handling of liquid chlorine for bleaching purposes, certain improvements and economies have been developed in the matter of control which makes this seem a subject worthy of description.

## EARLY BATCH MIXING PRACTICE USING CHLORINE

In the early experience with preparation of chlorine bleach no attempt was made to control the gas supply by means of special apparatus, but as the gas was obtainable in steel cylinders, holding approximately 100 lb. of chlorine (the filled cylinder weighing about 200 lb.), it was simply necessary to place the cylinder of chlorine on a platform scale and note the amount of gas used up in the preparation of stock chemic.

For further convenience in the daily preparation of large quantities of bleach-liquors, weighing the chlorine was dispensed with, as it was necessary only to discharge one full cylinder into each tank of soda liquor, holding about 800 gals., the cylinders being connected to a half-inch lead pipe leading to the bottom of tanks holding the liquor, and the chlorine allowed to enter at full capacity. Of course, means had to be employed to overcome reduction of the gas flow due to lowering of temperature caused by such rapid evaporation.

Formerly this was accomplished by placing the cylinders in tubs supplied with warm water, but later the liquid chlorine was allowed to flow from the cylinders placed in a horizontal position, and was conducted through a coiled section of the lead pipe submerged in a tub of warm water, the expanded gas escaping from the end of a lead pipe at bottom of chemic tank. By this means 100 lb. cylinders could be emptied in from one to one and a half hours.

## EXCESS OF ALKALI REQUIRED

It may be observed here that bleach liquors prepared as above described necessarily contain an excess of alkali to ensure stability, which in the case of soda ash is not of much consequence, excepting as regards cost, but in using an excess of caustic soda there is always danger of deleterious action on the cotton fiber, especially in warm weather, when oxycellulose is likely to form while the material is undergoing the bleaching operation, and may cause subsequent tendering and yellowing of the fabrics.

Before the introduction of proper control equipment, the procedure was as follows: At first soda ash alone was used to absorb the chlorine, in the proportion of about 3 to 1—that is, taking 300 lb. of soda ash in 800 gals. of water to each 100 lb. of liquid chlorine. This when run in the bleaching machines at 1 to 1½ deg. Tw. furnished a safe and active bleach, although the actual cost of such a bleach was somewhat higher than bleach made of chloride of lime. This cost was later reduced when the chemic tanks were charged with waste caustic soda recovered from mercerizing washings running from 4 to 6 deg. Tw. and enough soda ash added to bring the Twaddell up to about 10 deg.

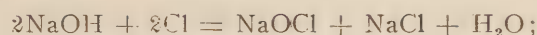
The excess of soda ash was required to ensure stability during the rapid absorption of the gas and while

storing the chemic. The bleaching strength was determined on each batch made by titration with N/10 arsenious acid.

## PREPARATION OF NEUTRAL CHEMIC

With the installation of Wallace and Tiernan chlorine-control equipment, the possibility of preparing neutral chemic from caustic-soda solutions at once removed the foregoing objections.

There being no need of using an excess of alkali with this method, the cost of soda ash formerly required was entirely eliminated, the waste caustic from mercerizing washings furnishing the necessary supply of alkali. On account of the perfect control of pressure and rate of flow of chlorine, it is possible to utilize caustic liquors of any convenience strength and obtain a sodium hypochlorite of any desired composition and uniformity. That is, by adjusting the chlorine feed-valve to supply just enough chlorine to combine with the sodium hydroxide in the caustic liquors, there is formed a neutral hypochlorite solution in accordance with the reaction:

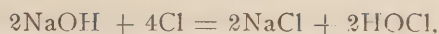


and such a bleach liquor is at once ready for use from the moment of starting and as long as the machine is kept running.

## FLEXIBILITY OF OPERATION

A valuable feature of this apparatus is its flexibility in operation. For instance, if a bleach liquor is required for storing any length of time, a slightly alkaline liquor can be prepared by simply reducing the proportion of chlorine to the caustic content of the absorbing liquor.

Or, if an acid bleach is required, an excess of chlorine is fed in, giving a hypochlorite solution according to the following reaction:



thus furnishing a safe means of producing the more rapid hypochlorous-acid bleach without the danger of liberating free chlorine, as was apt to occur by the old practice of adding acids to bleaching liquors, with attending deleterious effect on the goods.

## DESCRIPTION OF BLEACHERY INSTALLATION

A Wallace and Tiernan control equipment which has been under the writer's observation since August, 1920, at the plant of the Standard Bleachery Company, Carlton Hill, N. J., was installed to produce 500 gals. of bleach per hour, using only waste caustic liquors of about 4 deg. Tw. for absorbing the chlorine and furnishing a steady supply of chemic with from 1.25 to 1.5 per cent available chlorine.



The apparatus consists of a panel upon which is mounted a specially designed injector which effects the combination of the chlorine with the caustic solution. This combination is practically instantaneous, the chemic of full strength and ready for use, passing immediately to the stock tank. Indicating meters of the Venturi type are placed in both the chlorine and caustic lines on the panel. The chlorine gas is supplied at the desired rate and under constant pressure from an evaporator that is essentially a steam-heated water bath equipped with thermostat control and pressure-regulating valve.

#### SAVINGS BY USE OF THE APPARATUS

The saving in cost of soda ash in one week's run with the control of equipment as compared with a week during which the same yardage of goods was run by the older method amounted to \$33.

A comparison of six weeks' steady running of the control equipment with a similar period using part soda ash for chlorine absorption showed a total saving of \$219, or \$36.40 per week.—"Chemical and Metallurgical Engineering."

#### ILLUMINATING RESERVES (COLORED RESISTS) UNDER SULPHIDE DYES WITH VAT DYES OR SULPHIDE DYES

L. DISERENS

After a number of preliminary experiments, satisfactory results were obtained by padding the material in a solution containing 100 grams sodium carbonate and 40 grams glycerine per liter, drying and printing a mixture prepared from 150 grams Ciba Blue 2B, 20 per cent paste, 480 grams 25 per cent paste of British gum, 250 grams of 30 per cent solution of hydrosulphite sulphoxylate, 100 grams zinc chloride, 20 grams China clay, and 20 to 40 grams ferrous sulphate. The printed material is passed twice through the rapid ager, padded between the rollers with a solution of 40 grams Immedial Carbon BN, 40 grams sodium sulphide, 10 grams 32.5 per cent caustic soda, and 40 grams castor oil soap per liter, dried and passed twice through the rapid ager. Rinse in water, pass through a bath containing 50 grams 3 per cent hydrogen peroxide per liter, rinse, acidify, rinse, soap and dry. British gum undoubtedly was the best thickening to use, and the presence of some ferrous sulphate in the printing color was advantageous. By increasing the quantity of zinc chloride of 250 grams per liter dyeing with the sulphide color may be effected in an open bath and darker shades obtained. Moreover, it was found that zinc chloride could be used in the printing mixture in presence of alkali, so that the vat dye was not reduced in the printing paste, but only when passed through the rapid ager. A labile combination between the vat dye and the fiber was first formed, the dye being reduced by the hydrosulphite in the rapid ager, and fixation completed in the alkaline sulphide dye bath. The

quantity of caustic soda used is sufficient to neutralize about 25 per cent of the zinc chloride used, thus a mixture of 150 grams Ciba Blue 2B, 20 per cent paste, 250 grams of 35 per cent solution of hydrosulphite-sulphoxylate, 250 grams 35 per cent paste of British gum, 250 grams zinc chloride, 100 grams 32.5 per cent caustic soda is printed, dried, passed twice through the rapid ager for four minutes dyed in the sulphide dye-bath as above, rinsed well, acidified, rinsed and soaped. By this method sulphide dyes which are not very sensitive to zinc chloride, e. g., Sulphur Blue (Berlin), may be used for illuminating the reserve. It should be noted that excellent results are obtained by printing a mixture containing a vat color, zinc hydrosulphite and an alkali (caustic soda, borax, or sodium acetate), although this method requires special care.—Rev. Gen. des Mat. Col., through Jnl. Soc. Dyers & Colourists.

#### IMPROVED DYEING PROCESS

An improved process of aniline dyeing fabrics has recently been patented and is the result of a combination of certain old steps used in aniline dyeing with the process for waterproofing in such a way as to produce a new process giving a superior result. In the dyeing of cotton and silk it has been customary to impregnate the fabric with a mixture of aniline salt and chlorate of potassium or chlorate of soda, preferably in conjunction with a metallic salt, such as copper sulphate and then to develop the color by the process known as aging, which ordinarily consists in exposing the material so impregnated to the action of warm moist air until the first stage of oxidation has been reached the final oxidation being effected by passing the material as it comes from the aging chambers through a solution of a chromate or bichromate of an alkali. This final step is objectionable in that it is difficult to maintain the chrome both of uniform strength and it frequently results in weakening the goods and moreover it is difficult to produce the desired black, uniform in shade and quality and free from any objectionable tint of green or any other color.

According to the improved process the last step of passing this fabric through the chrome bath is omitted and the fabric is taken directly from the aging chamber to suitable machines adapted to give it the waterproofing treatment, which consists in impregnating the cloth with a saponaceous liquid such as sodium palmitate and aluminum acetate or sulphate and subjecting it to the effects of an electric current.

When the ordinary aniline black process is modified by eliminating the final step as above described, and the material is taken direct from the aging chamber to the waterproofing machines, there is produced a black which will not change color or green and the fabric is somewhat stronger than when treated in the chrome bath. The fabric, moreover, is waterproof and as the process is continuous, it may be economically carried out and all irregularities due to the weakening of the chrome bath eliminated.

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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## PROCEEDINGS OF THE A. A. T. C. C.

ONCE again announcement is made by officers of the American Association of Textile Chemists and Colorists that, owing to the fact that there have been no meetings of the Council or of the local Sections recently, there is not sufficient material to warrant printing the Proceedings of the organization in this issue.

Meetings scheduled to take place at the time of going to press include those of the Research Committee and of the Council, both of which will be held at the Engineers' Club, Boston, Mass., on Saturday, April 22. On that date there was also planned a meeting of the Northern New England Section at the Engineers' Club, Boston, at 5 o'clock, which was to take the form of an "experience meeting" devoted to the general subject, "Shady Goods." According to the announcement of A. K. Johnson, Secretary of this Section, those scheduled to read five-minute papers before the regular discussion were Frederick Spencer, Leverett N. Putnam, Louis F. Bume, Frank E. Johnson and Walter F. Haskell. A meeting of the New York Section was scheduled for Friday evening, April 21, at the Pennsylvania Hotel, that city.

Reports of these meetings and other activities will appear in the Proceedings in the issue of May 8, which will also include the final part of "The Development of Tests for the Fastness of Dyestuffs" (Murray).

## THREE FULL YEARS

ACCORDING to the present text of the proposed dye section of the Fordney permanent tariff, the licensing control of dye importations is to be extended for one year after date of the passage of the act, whenever that may be; and, in addition, President Harding is expressly empowered at the end of that year to extend the licensing system for yet another year if he finds conditions warrant such action. In view of the

fact that any investigation of that sort would undoubtedly reveal the necessity for such extension, and of President Harding's well-known attitude toward the industry, the necessity for its preservation, and the inadequacy of straight tariff methods for accomplishing this, it seems reasonably certain to predict that the licensing system will remain in force for two full years, plus the length of time which will elapse between today and the date of passage of the Fordney measure.

This hope is possible for the reason, outlined in our last issue, that it is believed that the recommendation of the Senate Finance Committee will not meet with sufficient opposition on the floor of the Senate to prevent the passage of the dye section, unchanged.

Should this occur, as it probably will, it will be a signal for many of the representatives of our daily press, and some of our trade press, to say, editorially, "This should satisfy the dye makers. Two more years of protection should be sufficient."

But it should not and does not satisfy the dye makers, nor the majority of dye consumers who want to see the domestic industry develop its service to them, for the reason that two years is not sufficient time in which to expand to a point where that service can be provided in a satisfactory manner. But even assuming, for the sake of argument, that two years would bring about this happy result, still the arrangement is neither fair nor satisfactory to the dye makers and the consumers above specified.

Those acquainted with conditions are reasonably sure, and in many cases may be willing to assert, that there will be two more years of licensing protection. Let the reader suppose that he is willing to write and publish such an assertion. Then let him take his published statement to the president of a bank and ask the latter to lend him several thousand dollars with which to bet that his published assertion is correct.

The reader knows what the bank president's answer would be, or what his own would be if similarly placed. He would not think of doing such a thing; yet that is exactly what the dye industry will have to do if it is to achieve real progress in the two years of protection which may lie before it. It must ask the banks to lend it money with which to bet that President Harding's recommendation at the end of a year will be for an additional year's protection.

Owing to the innumerable and exasperating delays which have prevented the passage of really constructive dye legislation ever since May, 1919, opponents of adequate protection are enabled to say that the industry has enjoyed three years of protection already, and that it has now been given two years more, making a total of five. It is easy to see how misleading such a statement, in clever hands, can be. The true state of affairs was again emphasized recently by Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association of America, who pointed out that the proposed plan would only aggra-



vate a serious situation, and would in no way be more helpful to the industries than would the tariff rates proposed by Senator Smoot.

"What we must have," Dr. Herty declared, "is the assurance that manufacturers of dyestuffs can go on for a definite period without fear of foreign competition, before banks and other financial institutions will feel secure in loaning money for the promotion and continuation of the chemical industry. Without definite assurance from Congress that the industry will be protected by the licensing system for at least three years, there is no need of looking to financial institutions for capital to carry on development work."

It is true, therefore, that the dye industry has had three years of licensing protection, but when one considers that these three years have been offered it piecemeal, often for only a few months at a time, and never for any fixed period, one can readily see why the three years have not produced anything like the maximum progress, and why two years more, on practically the same terms, can only be a hollow mockery of protection.

And, finally, two years, even under ideal conditions, is not sufficient. That is not the fault of the dye makers, but merely of natural conditions over which neither they nor Congress have any control. Three years of definitely assured protection might suffice; it is, at least, the minimum time in which satisfactory results can be secured.

Therefore it is the determination of the dye and coal-tar chemical industries to make another stand for three full years before the measure is disposed of by the Senate, and in this effort they should receive the support of all consumers who have the good sense to look beyond the immediate present.

### "THE NEXT BIG THING"

IT is estimated that at the present time there are between 500,000 and 600,000 amateur "sets" for receiving wireless telephonic messages in the United States, and it is known that by far the larger portion of these have been installed during the past year—perhaps during the past seven or eight months. The reason for this enormous and remarkably rapid increase in the use of these instruments is found in the programs of musical entertainment, lectures, children's stories, news and market reports, official time signals, weather predictions, etc., which are broadcasted daily by the sixty-odd sending stations devoted to this purpose.

Many who read this will already be aware of the facts given above, and indeed are probably making use of their own instruments; but those who are not will soon have it literally forced upon their attention, for radiotelephony can no more be ignored than the automobile; it is neither a nine-day wonder nor a fad of the moment. As an intimate concern of the human race, it is, beyond a doubt, "the next big thing."

Aside from this aspect of it, it is believed that there

are reasons why practically all readers of *The Reporter* will feel at least an academic interest in this new and swiftly expanding industry. Not only does it furnish some striking comparisons and contrasts with the dye industry, but likewise within it dwell possibilities which may recommend themselves as being more or less worth looking into—merely as a side issue, of course!

Let us begin with a contrast. "This," according to a writer on the subject,\* "is how a wireless fan in England sends a message: First he writes it out on a very thin piece of tissue paper. . . . Then he goes out into the yard or up on the roof, opens the door of a little shed, ties the message to the leg of a carrier pigeon he finds there, and turns the pigeon loose. There are hundreds of thousands of these pigeon wireless fans in England. The trouble they go to in order to get a message to a friend is astonishing. It is about a three-day job. . . . And the carrier pigeon fan is about the nearest thing they have to a wireless amateur in England. The laws against the wireless amateur in England are so strong that there's hardly any use of a young man either making or buying an outfit."

Which is distinctly worth noting at the present time.

"Across the English Channel in France, the amateur wireless fan, Pierre, must do everything under the bed. Let one of his ether whispers get out into the air, and he'll have a Government policeman at his house in short order. The French army owns French ether, and it doesn't allow any loafing or trespassing therein. I traveled from one end of France to the other last year, and criss-crossed the country, but never once did I see an amateur wireless set. . . .

"In Germany the Government owns the ether. An amateur has no more right to trespass therein than he would have to go behind the screen in the post office and help to sort letters or sell postage stamps. I tried to find wireless amateurs in Germany last winter and I discovered not one. It might be possible for an amateur to rig up an apparatus secretly and listen in on Nauen, but your true amateur is not satisfied with playing the sneak and listening in without taking an active part in the throbbing of the ether waves.

"In little Holland, now and then, you see the rigging of an amateur wireless on private homes. But these are always fine big homes and you realize that here the wireless set is the toy of the rich."

What is found, then, in the United States? The answer is contained in the opening paragraph of this article—and what is more, the Government of this country has for the past ten years offered the amateur every possible encouragement, has assigned him station call numbers and published them, has allowed him to listen in on anything his apparatus could pick up, and has generally displayed an attitude calculated to foster the increase of trained operators, or young men who could be made into trained operators on short notice with very little addi-

\*William G. Shepherd, "Popular Radio," May, 1922.

tional instruction. And the wisdom of this policy was more than demonstrated during the war, and would be demonstrated again, still more potently, should the war be repeated.

With the recent great increase in popularity has come a conference in Washington, at which, for the prevention of undue interference, special wave lengths were assigned to various classes of stations. Secretary of Commerce Herbert Hoover has been given control of the regulation of this huge business. And the able and far-seeing Mr. Hoover says:

"In certain countries, the Government has prohibited the use of receiving instruments except upon payment of a fee. . . . I believe that we ought to allow anyone to put in receiving stations who wishes to do so. But the immediate problem arises of who will do the broadcasting and what will be his purpose. It is my belief that, with the variations that can be given with different wave lengths, through different times of day, and through the staggering of stations of different wave lengths in different parts of the country, it will be possible to accommodate the most proper demands and at the same time to protect that precious thing—the American small boy, to whom so much of this rapid expansion of interest is due."

By this time we have seen quite enough to realize the fundamental difference between the attitude of the United States Government toward the subject of radiotelephony, and the attitudes of European Governments. The development of the radio industry is now as important to any country as is the development of the coal-tar chemical industries. Our Government is showing signs of going to as much trouble to encourage radiotelephony as did the German Government to encourage the coal-tar chemical industries—which have met nothing but discouragement in the United States. For once we appear to have "stolen a march" on the field in a subject of vital importance to all of us, and in view of this it is just a little difficult to understand how our Government can be so alive to the future uses and possibilities of the one, and so unresponsive to the inherent uses and possibilities of the other. Can it be that we are waking up, and if so, will this new alertness extend to another equally vital industry before it is too late? It is to be hoped that it will.

The subject under discussion is an extremely broad one, and hence we must hurry on. Further points of interest to be noted in passing are that Germany, for one, does not propose to remain asleep long, for already a group of German business men are planning a visit to the United States for the express purpose of studying conditions in our radio industry, the handling of the amateur, factors influencing development, etc.; that the present condition of the radio industry parallels very closely the condition of the dye industry in the days when the "gyp" was rampant and the demand had so far outstripped production that hundreds of would-be Wallingfords were constructing, owned stock in, or were agents for, "dye plants" with the result that the market was flooded with all sorts of rubbish; and that the new industry has already begun to make increased demands on our coal-tar

chemical manufacturers for phenolic condensation products such as Bakelite, Condensite and other efficient insulating materials for panels and parts of apparatus.

All this, as before hinted, is probably of at least academic interest to readers of *The Reporter*; but now, it seems, there may be an angle of the industry in which something more than an academic interest can be felt.

At the dye hearings being conducted by the Senate investigators, an elderly lady describing herself as Dr. Emma Reba Bailey, of Rome, Ga., rose and asked to be heard on the dye question, stating that the *vox populi* had not been represented at the hearings and that she intended to assume the burden of representation herself, since no one else would come forward.

She then said that German dyes were far superior to American dyes, and that she wanted no restrictions in the way of obtaining them.

"The black waist which I have on, given me by my daughter for a Christmas present, will not stand washing, and the dye rubs off whenever it is worn," she is reported to have said. "I come from a cotton country, and I think we are entitled to dyes that will stay fast on cotton textiles." She added that if there were but 150 manufacturers of dyestuffs in the United States, the industry was a monopoly, and that the 110,000,000 people in the country should be considered, rather than a handful of manufacturers.

Chairman Shortridge, amid general amusement, courteously suggested that Dr. Bailey get in touch with Herman A. Metz, who both manufactured and imported dyes and who declared his manufactured products to be the equal of any of the foreign.

Now this incident, aside from providing material for a little mild merriment, should likewise provide food for a little serious thought. Here is a woman, mature, of sufficient intelligence to obtain a degree, whose reasoning processes are beyond a doubt average or better, who merely lacks possession of a complete set of facts to consider before making a final deduction; and in any case she is entitled to credit for having the courage to go before a United States Senate committee with her views. But the real point is that there are thousands of Dr. Baileys, both male and female, in this country, and that they, in the aggregate, are largely the force which animates, or checks, Congress. And as has repeatedly been emphasized, full information on the subject of dye protection would have led to definite action of some sort before this.

One of the best ways of fostering progress is to make a subject understood to a majority of the active people concerned. How to disseminate the necessary information in the most efficient manner—which means in the shortest possible time and at the least expense—is difficult, sometimes, to decide. A new implement is at hand. No one dreamed of broadcasting's possibilities ten years ago. To quote another writer, "It was regarded as a serious limitation that radio communication was not secret and that there was no more privacy about a message than there is about a corner political meeting. What



was once a drawback, however, is now a technical virtue. Broadcasting, a new way of reaching thousands, and even millions, is the outcome. . . . Education? We shall hear the Einsteins and Wellses of the future radio university expound their views to us with as much personal directness as if we were sitting in their presence. We used to call the telegraph and telephone "space annihilators." Space annihilation, indeed! We never knew what the term meant until radio broadcasting came."

And, while the above is somewhat general and refers in part to the future, the important specific details of it are that, without waiting for any further development, broadcasting to-day furnishes a means of reaching larger audiences than could be assembled save by a great public demonstration of some sort, or the advertising of a world-famous artist or notable personage; that practically all broadcasting programs daily include one or more fifteen or twenty minute lectures on every conceivable subject of educational or general interest, and that, so far as is known, arrangements to speak can be made by any one who is willing to volunteer his services, provided his subject meets with the approval of those in charge.

That is all in the way of a thought we wish to leave with readers at present. Viewed from the outside, this subject plainly indicates its claim to further investigation by those desiring to impart real information on topics concerning the welfare of the country at large. Those who have not acquired the proper mental background from the foregoing extremely limited exposition of the subject will have to go the rest of the way for themselves, upon having done which they will realize, we believe, the possibilities we have tried to point out, and will be able to establish the very real and intimate connection which now exists between themselves and the public. Or it may be that we shall again comment upon it in these pages, even at the risk of "dragging in," so to speak, what must yet appear to some to be a foreign subject.

Let us assure such, in conclusion, that it is not a "foreign subject," and once more bear heavily upon the fact that the amateur radio receiving set is neither a toy nor a fad. This being the case, its possible relation to the cause of any fundamental concern of our national life must be considered.

#### URGES A. C. S. TO FORM GAS DEFENSE COMMITTEE

Dr. W. C. Geer, of Akron, Ohio, urged the American Chemical Society at Binghamton to take steps to form a "gas defense committee," as a means of protecting Americans in case of another war.

"Our friends in Washington," said Dr. Geer, "may agree to abolish poison gases from warfare. We should, however, be active in preparing methods of defense. We are forbidden to carry concealed weapons, but there is no law of God or man to prevent us from the use of locks on our doors and bolts on our windows.

"I would earnestly recommend to the American Chemical Society the formation of a gas defense committee to investigate gas masks and other protective clothing, alone,

as far-sighted patriotic citizens, if co-operation with the War Department be not allowed. It is a field in which research work of a co-operative character can be undertaken, with who knows what valuable results to us in the future."

### INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

F. A. A.—*Question:* I am enclosing a sample of raw cotton stock dyed with Katheton Tan, 9 per cent shade,  $6\frac{1}{2}$  per cent  $\text{Na}_2\text{S}$ ,  $1\frac{1}{2}$  per cent  $\text{Na}_2\text{CO}_3$ , and 20 per cent  $\text{NaCl}$ , well washed, and aftertreated with 1 per cent  $\text{Na}_2\text{Cr}_2\text{O}_7$ , 1 per cent  $\text{CuSO}_4$ , and 2 per cent  $\text{HCOOH}$ . After this treatment the stock is again well washed, extracted and dried.

This stock does not card well and in the spinning breaks continually. I would like to have you examine the enclosed sample carefully, and, if possible, suggest a remedy for the trouble now being experienced.

*Answer:* We are of the opinion that the trouble with the material submitted is that it is tender. This explains why it does not card well or spin well and breaks continually.

As to the exact reason for this condition we cannot say, but it is probable that it is owing to the development in some way, through oxidation, of free sulphuric acid in the stock, perhaps after it has been washed and dried. It should be thoroughly washed after it is dyed before after-treatment and it would be well, after the aftertreatment and washing, to give it a final rinsing in an alkaline bath or one containing sodium acetate, leaving a little of these materials in the fiber.

B. L. M. Co.—*Question:* I am sending you under separate cover clippings of artificial silk lace with a mixture of silk and cotton in the gray. Also a sample of bleached silk, together with various dyed samples of the same fabric.

I have found it a very difficult matter to overcome the striped effect which you will note in the various dyed samples. Likewise note same in the original raw sample. This no doubt is due to the chemical reaction on the different grades of artificial silk when manufactured or bleached.

I would greatly appreciate it if you would kindly advise through your Inquiry Department how I may overcome this difficulty.

In our opinion the only real solution of your problem lies in the weaving; the fact that two kinds of artificial silk were used being responsible for the uneven results.

We have performed several experiments in an effort to determine if it were possible either to retard the dyeing of one type or accelerate the dyeing of the other, but have had only indifferent results. In some cases it has been possible to get an approximately even shade, but inasmuch as each color would have to be treated in a different way, and as it has been impossible to get really satisfactory results in any case, we feel that the only way for you to utilize this stock is to endeavor to turn the condition of your woven material into an asset and try for two-color effects. This would, however, be a pretty difficult proposition and we believe the only real solution is for you to insist that your material be woven with the same character of raw silk throughout.

## Review of Recent Literature

*The Fundamental Processes of Dye Chemistry.* Dr. Hans Eduard Fierz-David. Translation of Frederick A. Mason, M.A. (Oxon.), Ph.D. (Munich); 236 pages and index; 6x9; 45 illustrations, including 19 plates. New York, D. Van Nostrand Company.

While excellently filling the needs of both beginning and advanced students—particularly those about to enter upon careers as works chemists, this volume should form an almost invaluable adjunct to the library of the laboratory worker to supplement his textbooks on laboratory practice. It is thorough, comprehensive, and lucid. As the author points out, ignorance of elementary facts leads to waste of time in practice. Time thus wasted may be saved in future by suitable instruction; nor should it be forgotten that many of the essential features of chemical craft may be learned from books. Although well aware of the existence of a large literature dealing with laboratory practice, the author holds that there does not appear to exist a suitable introduction to the fundamental operations of dye chemistry. The present work is an attempt to fill that vacancy.

The subject is divided into sections dealing with intermediates, with descriptions of their production in a manner which should be helpful even to those unfamiliar with technical operations; the dyes themselves, technical details, and analytical details. Since azo colors form the largest class of artificial dyes, most attention has been given to the preparation of the necessary intermediates; but since, however, many of these intermediates are also used in the synthesis of other classes of dyes, such as Indigo, Azines, Thiazines, Aniline Black, the sulphur col-

ors, and Triphenylmethane dyes, the field of synthetic colors in its essential features is covered by the present volume. There are also given recipes for a few dyes, together with general observations on the technique of dye manufacture. With only trifling exceptions, the dyes dealt with can all be obtained from the intermediates described in the first portion, so that the reader is enabled to obtain a comprehensive view of the successive stages of development of a dye. The first few recipes are given in as great detail as possible, frequent reference being made to them later. An attempt has been made to describe the processes in such a way as to give, besides the laboratory details, a clear indication of the method of carrying out the process in the works. There would be no point whatever in giving either laboratory recipes or works recipes alone, as only by acquaintanceship can the budding chemist get an insight into the technical side of the industry.

Anticipating a possible objection that the patent literature of the subject has been almost entirely neglected, the author discloses his intention to avoid, as far as possible, confusion of the beginner by numerous references, but adds that those who desire information on patents will find their requirements admirably met in the works compiled by Friedlaender and by Winther.

The recipes given in this work are intended to be regarded in the light of finger-posts, and they make no claim to being the best, since "many paths lead to Rome." All the examples given, however, have been actually tested by the author, and in the majority of cases they have also been put through the works under his personal supervision, so that they may be regarded as being technically satisfactory.

The complete list of contents includes:

I. Intermediate Products.—(1) Sulphonations; (2) Nitrations and Reductions; (3) Chlorinations; (4) Oxidations; (5) Condensations.

II. Dyes.—(6) Azo Dyes; (7) Triphenylmethane Dyes; (8) Sulphur Melts; (9) Miscellaneous Dyes; (10) Summary of the Most Important Methods: Sulphonations, Nitrations, Reductions, Oxidations, Alkali Fusions, Methods of Coupling.

III. Technical Details.—(11) Vacuum Distillations in the Laboratory and on the Works: Diphlegmation, Kubierschky Column, Raschig Column, Vacuum Pumps, Apparatus for the Distillation of Naphthols, Apparatus for Distillation Under Reduced Pressure in the Laboratory; (12) Notes Upon the Construction and Use of Autoclaves: Description of Autoclaves and Structural Material (material, liner, stuffing-box, safety-valve, thermometer, stirrer, etc.), Setting Up and Working, Methods of Heating, Laboratory Autoclave, Rotary Autoclaves, General Rules for the Use of Pressure Vessels, Pressure Curve for Aqueous Caustic Soda of Various Concentrations; (13) Structural Materials Used in Dye Chemistry: Metals, Non-Metals. Structural Materials of Organic Origin; (14) Technical Notes on Works Management: Significance of



the Dye Industry, Specialties and Mass Production, "Interessengemeinschaften" or "Rings," Arrangement of a Modern Color Factory, Organization, Works, Expenses, Steam Consumption, Utilization of Steam, Compressed Air and Vacuum, Duties of the Works Chemist, Manufacture, Standard Colors, Drying, Making Up to Type, Grinding, Mixing; (15) Example of Costing of a Simple Dye: Orange II, melt of sodium salt of B-naphthalene-monosulphonic acid, sulphanilic acid, B-naphthol.

IV. Analytical Section.—(16) Analytical Details: General, Preparation of Standards for Titration, Estimation of Amines, Naphthols, Dihydroxynaphthalene, Aminonaphthol Sulphonic Acids, Naphthol Sulphonic Acids, Dihydroxynaphthalene mono- and di-sulphonic acids, The Common Test Papers, Reagent Solutions for "Spotting" on Filter-Paper, Estimation of Zinc Dust and Lead Peroxide Paste.

*Bleaching and Related Processes.* J. Merritt Matthews, Ph.D. 676 pages, 300 illustrations. The Chemical Catalog Company, Inc., New York, 1921. Price \$8.00 net.

Because of his extensive experience as a textile chemist, and particularly because he has specialized to a considerable extent as regards cotton bleaching, the author is especially well equipped to write an authoritative book upon this subject. Combining his own first-hand knowledge of the subject with the most reliable information and data to be obtained from the general literature, he has succeeded in bringing together in one volume the most comprehensive and exhaustive treatise upon this branch of textile chemistry that has thus far appeared in English, if not in any other language.

The arrangement of the text is such that one may find a continuous and complete discussion of the preliminary treatment and bleaching of the common textile fibers. As would naturally be expected from the relative importance of cotton bleaching, by far the larger portion of the book is devoted to this fiber. The last one hundred pages are devoted to the testing of the various chemicals and materials used in the processes described and will prove a valuable reference guide to chemists engaged in bleaching, scouring and finishing plants.

The subject matter is excellently illustrated, and while the writer specifically states in the preface that he has purposely omitted the dry details of mechanical description in regard to these illustrations, there are instances where a little more detail would have undoubtedly been of interest to seriously minded readers and students.

At the end there will be found an excellent bibliography and a comprehensive index.

The volume should form a valuable addition to the working library of every textile chemist and bleacher.

—Louis A. Olney, in *Jour. Ind. & Eng. Chem.*

## Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: \*Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

1249.\*—A commercial agent in India desires to secure the representation of firms for the sale of 50 tons of concentrated Congo red; magenta crystals, green crystals, acid orange, and other aniline dyes; annealed wire, 16 gauge, packed in coils of one hundredweight; barbed wire, 12 gauge, 3 inches apart, 4 points, and 2-ply galvanized iron wire; bolts and nuts, hexagon head, round neck and hexagon nuts, size  $\frac{1}{2}$ ,  $\frac{3}{4}$ ,  $\frac{5}{8}$ ,  $\frac{7}{8}$ , and 1 inch, lengths from  $\frac{1}{2}$  to 14 inches, in lots of 10 tons minimum; and wood screws. Quotations should be given c. i. f. Indian port. References.

1257.\*—The purchase is desired by a mercantile firm in India of caustic soda and sundries in wholesale quantities. Quotations should be given c. i. f. Karachi. Payment: Letter of credit against documents. Reference.

1297.\*—A merchant in Spain desires to purchase mineral oils in large quantities, cotton nets for fishing, and tin in plates. Quotations requested c. i. f. Spanish port. Correspondence should be in Spanish. References.

1300.\*—A commercial agent in Canada desires to secure the representation of firms for the sale of dry goods, haberdashery, novelties, specialties, etc. Reference.

1302.\*—Inquiries have been received from firms in Spain desiring to purchase ship-chandlery goods, such as paints and varnishes, oils, ships hardware, cordage, rigging, wire rope, belting, packing, rubber goods, linoleum, ships' lights, safety lanterns, canvas, sailcloth, oars, boat hooks, log lines, and diving sets. Catalogues and quotations c. i. f. Spanish ports are requested. Correspondence should be in Spanish. References.

1303.\*—A firm in New Zealand desires to secure an

agency from manufacturers for the sale of appliances and accessories pertaining to the clothing manufacturing industry, small hardware, fancy goods and novelties, and cigars. References.

1281.\*—The purchase is desired by a mercantile firm in Spain of automobile accessories, cotton waste, belting of leather, balata, cotton, and camel hair, packings, rubber in sheets, and naval stores. Quotations should be given c. i. f. Spanish port. Correspondence requested in Spanish. References.

1282.†—A commercial agent from France is in the United States and desires to secure the representation of firms for the sale of raw cotton in the western European countries. Reference.

1321.\*—Inquiries have been received from various firms in Spain for the purchase of articles of travel, haberdashery, razors, gloves, fancy goods, silk goods, perfumes, and glassware and novelties. Quotations are requested c. i. f. Spanish port. Correspondence should be in Spanish. References.

1330.\*—An agency is desired by a firm in Brazil for the sale of hardware, tools, and dry goods, such as dress goods, shirtings, suits, calicos, drills, and cambrics. Correspondence should be in Portuguese. References.

1108.\*—An agency is desired by a merchant in France for the sale of cotton, rice, sugar, cocoa, coffee and dried and canned fruits. Quotations should be given f. o. b. American ports or c. i. f. French ports. Terms: Cash against documents. Reference.

1112.‡—A manufacturer in Spain using large quantities of embroidery cotton in skeins now desires to purchase in the United States, and requests quotations from American firms. Reference.

1126.‡—An American firm having a traveling representative in Brazil and Uruguay desires to secure the representation of firms for the sale of mercerized cotton yarn and silk yarn for the manufacture of hosiery; leather, shoemakers' supplies, electrical goods, hardware, and notions such as leather belts, garters, suspenders, arm bands, snap fasteners, pins, and hooks and eyes. References.

### SCHLAKE DYE WORKS WILL BE LARGEST IN MIDDLE WEST

The Middle West has its first large dye and finishing works now that the Schlake Dye Works at 4205-5219 West Grand Avenue, Chicago, is completed and rapidly getting into operation. This concern has been for several years operated under the management of Theodore H. Schlake, 1221 North Oakley Boulevard, that city, dyeing all grades of yarn—silk, cotton, wool.

worsted and merino for knitters and weavers. The great Middle West section of which Chicago is the center has been, of late years, acquiring a large portion of the increase in textile manufacturing industry and many plants that only a few years ago were small have expanded into large proportions and many medium-sized plants have been installed and all are apparently running with marked success making high-grade products, providing an ever-increasing demand for dyeing and finishing; this accounts for the expansion of the Schlake Dye Works operations and the consequent necessity for increased facilities for turning out better work and more of it. The new plant includes machinery and apparatus for the bleaching and dyeing of skein yarns, hosiery dyeing, finished products dyeing and silk weighting. Machinery and equipment has already been purchased. Work on the building started not long since and will cover 25,000 square feet, measuring 200 feet on Grand avenue and 125 feet deep, costing approximately \$250,000. This plant, the buildings of which are constructed of brick, will employ, at the start, 50 employees with provisions made for increasing the output.

### N. C. TEXTILE SCHOOL STUDENTS HEAR ADDRESSES

At the last meeting of the Tompkins Textile Society, which is composed of students taking the textile course at the North Carolina State College, an address was delivered by S. W. Jen, on the subject, "Textile Manufacturing in China." Mr. Jen is from Shanghai, having previously graduated from a textile school in that city. He is now taking an advanced textile course in the textile department of the North Carolina State College, which is the textile school of North Carolina, and will graduate at the end of the present school year, when he expects to return to China to enter textile manufacturing.

At the meetings of this society various members take part and discuss different phases of textile manufacturing and allied industries, in which they are assisted by the faculty of the department. W. I. Pickens, who will also graduate in May, addressed the society on the subject of "Commission Houses and Their Relation to the Textile Trade."

Professor Nelson, who has charge of the Textile Department, addressed the meeting, taking for his subject, "How to Advance in the Textile Industry After Graduation."

### FARADAY AND DYES

"Faraday discovered benzene, or, as he then termed it, bicarburet of hydrogen, among the products of the condensed oil-gas manufactured by the Portable Gas Company. Faraday may thus be said to have laid the foundation of that immense industry which recent discoveries in chemistry have so rapidly developed—the manufacture of the so-called aniline dyes."—Thorpe's Essays in Historical Chemistry.





## MEN OF MARK in the DYESTUFF FIELD

**WALTER M. SCOTT**

Chief Chemist

**Cheny Brothers**

South Manchester, Conn.

**W**ALTER MOODY SCOTT was, as he himself phrases it, "born and raised a Connecticut Yankee." On completing his common and preparatory school education he entered the Sheffield Scientific School of Yale University, from which he graduated in 1912 with the degree of Ph.B. During his senior year at that institution he was elected to membership in the honorary society of Sigma Xi.

For the next three years he elected to pursue graduate studies at Yale, specializing in organic chemistry. During this period he also acted as Assistant Instructor in the chemical laboratory, and in 1915 he received the degree of Ph.D.

With the exception of about one year of service in the army as a lieutenant in the Sanitary Corps, his connection with Cheny Brothers dates continuously from 1915 to the present time. He occupies the position of chief chemist to this silk manufacturing firm, being in charge of the laboratory and also of the purchase of dyestuffs and chemicals for use in the plant.

He is an active member of the American Association of Textile Chemists and Colorists, of which he is one of the Councillors, and likewise takes an active interest in the work of the Research Committee of this organization. He is a member of the American Chemical Society, and of the Chemists' Club of New York.

Incidentally, Dr. Scott takes a lively interest in lawn tennis, and acts as official representative of the Manchester Country Club to the U. S. Lawn Tennis Association. He is willing, he informs us, to challenge any textile chemist to a match for supremacy in this sport.

## THINGS EVERY TEXTILE CHEMIST AND COLORIST SHOULD KNOW

### No. 4—Reclaimed and Extracted Animal Fibers

(Concluded from page 294.)

uniform color. Shoddy of this type can be extensively used in the manufacture of comparatively high-grade woolen cloth when properly blended with high grade virgin wools. Goods can be manufactured containing as high as 95 per cent of a high-grade shoddy and present a very respectable appearance, and also possess fair wearing qualities, but this percentage, of course, is not recommended.

#### MUNGO

Mungo is the term applied to fibers reclaimed from milled or felted rags, the individual fibers being more or less tightly attached to each other. In this type of fabric considerable resistance is offered when the fibers are torn apart. As a result the fibers become ruptured and injured and mungo is therefore of lower grade than the shoddy prepared from unfelted fabrics.

#### EXTRACTED WOOL

Extracted wool results from the carbonization of rags and textile material composed of cotton and wool fibers. The carbonization process completely destroys the cotton and any other vegetable fibers that may be present, leaving the wool unchanged. The term extracted wool therefore applies to the source, and has no specific bearing upon the quality of the product. The value of extracted wool therefore will depend very largely upon its source. For instance, fibers reclaimed from a fabric consisting of a cotton warp with a woolen yarn for filling, or a low-grade woolen which was originally made by carding cotton and perhaps low-grade wool and some shoddy together, will correspond to a medium or low-grade mungo.

In the manufacture of very low-grade shoddies it is sometimes the case that no attempt is made to extract the cotton which, in the original fabric, was carded with the wool.

#### DETECTION AND ESTIMATION OF SHODDY

The satisfactory detection of shoddy in a fabric is a difficult matter. There is no chemical process that can be used for obtaining a separation of wool and shoddy, because chemically shoddy and wool are of the same composition. The microscope is the only means, and this on the whole is very unsatisfactory. Any method of detection is based upon the fact that the fibers become more or less injured and ruptured during the manufacture of the reclaimed wool and in some instances a partial but decidedly unreliable separation can be made. It must be borne in mind that the process of tearing a woolen fabric

apart for examination is in reality a modification of the process of making shoddy; therefore fibers torn from a felted fabric though originally made entirely of new wool might readily give the characteristic appearance of shoddy.

For these reasons, no accurate determination of the percentage of shoddy in a fabric can be made and any examination with the microscope can only result in an estimation, with wide limit of error.

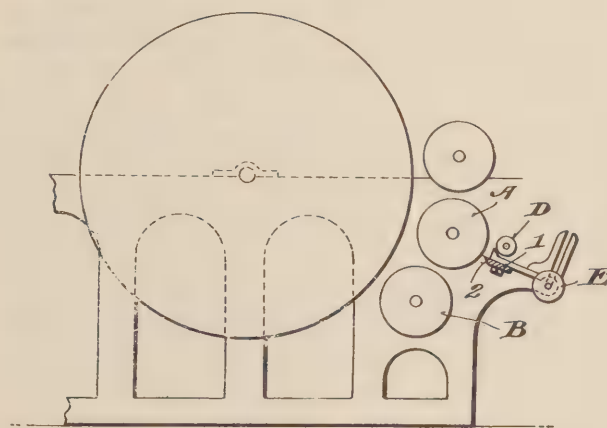
## Recent Patents

### Carding or Straightening the Fibers of Cotton (1,406,474; February 14, 1922)

DANIEL E. MOLLOY, Fall River, Mass.

This relates to certain new and useful improvements in carding or straightening the fiber of cotton, and relates especially to what are known as revolving flat cards used in the textile art for carding or straightening the fiber of cotton.

The primary object of the invention is to provide means which will act upon the cotton passing into the machine under the feed roll so as to cause the fibers to be straightened by what is commonly termed the licker-in.



A further object of the invention is to provide means of the type mentioned which is adjustable, and which will operate effectively and with certainty to function as above described.

Briefly, the invention resides in the employment of a bar or the like having a sharp or knife edge which is adjusted to such point that the cotton passing into the machine under the feed roll will be drawn across the sharp edge of the metal bar or knife and thereby cause the fibers to be straightened by the licker-in as the latter draws the cotton over the knife edge.

The drawing is a fragmentary side elevation, partly in section, showing the invention in position on a carding machine.

In proceeding in accordance with the present inven-



tion it will be understood that the rolls depicted in the drawing are in practice supplied with the usual card cloth, and that the machine itself is otherwise of the usual structure employed in the cotton mills.

Accordingly it will be understood that the roll of cotton known as the lap is supported on the lap roll E and passes under the feed roll D to what is commonly termed the licker-in, the latter being designated A in the drawings. From the licker-in the cotton is carried downward and over the roll B, the latter acting to remove the short fibers carried into the machine by the licker-in A, and the cotton is then stripped from the roll B permitting it to pass to the main cylinder C, from which latter it is stripped and operated upon by the various flats until it finally reaches the opposite end of the machine, where it is doffed or removed from the main cylinder and passes out of the machine.

The present invention particularly resides in the use and combination with certain of the above parts to be described, of an elongated bar 1 which is beveled along one edge to form a cutter or knife 2. This bar may have slots through which bolts pass to rigidly secure same to the usual feed table, the bar being preferably disposed beneath the table. The knife edge is disposed adjacent to the periphery of the licker-in, and can be adjusted toward and away from same as is obvious by means of the bolts and slots, the adjustment being such that the cotton passing into the machine under the feed roll D will be drawn across the sharp edge to straighten the fibers.

In operation the roll of cotton is supported on the lap roll E and passes under the feed roll D, and is then drawn by the licker-in A across the sharp edge of the bar or knife, so that its fibers will be straightened, following which the cotton is carried downward over the roll B, whereupon the latter removing the short fleece from the licker-in whereupon the cotton passes to the main cylinder, from which latter it is stripped and operated upon by the various flats until it finally reaches the opposite end of the machine where it is stripped or removed from the main cylinder and passes out of the machine.

#### **Manufacture of Artificial Goods from Viscose**

(1,407,696; February 28, 1922)

MAX LUFT, Boras, Sweden

This invention relates to the manufacture of artificial fabrics, filaments, films and the like articles from viscose (cellulose-xanthate) and has for its object to render the manufacture more expeditious and produce a cellulose which is of uniform character, consistency, luster and feel.

The manufacture of filaments, films, plates and the like from viscose, which forms an unstable solution, depends upon several conditions; as, for instance, upon the state of maturation of the viscose, upon the several by-products and the partly gaseous objectionable products of decomposition of the xanthate. These conditions are practically for the most part not controlla-

ble and cause great losses of material and affect the luster, the strength and the uniformity of the formed cellulose-hydrates.

Inventor has found that the acids of the naphthenes or the aqueous solutions of their salts added to the solution of xanthate have a surprisingly favorable effect, as they bind the sulphur by-products and the impurities of the viscose, improve the uniformity and durability of the solution and render the precipitation or separation of the cellulose-hydrates uniform and independent from the state of maturation of the raw viscose used. The raw viscose treated with acids of the naphthenes gives by the precipitation in acids or salt solutions goods of an improved quality.

The acids of the naphthenes (the carboxyl derivatives of the naphthenes or the polymethylenes) are to be found in large quantities in petroleum (naphtha) and are obtained as waste products from the distillation of petroleum in the form of alkaline salts of the naphthenes. Their affinity for sulphur and for sulphides is—according to Renouard "Les matieres grasses" 1919—so intensive that they are capable to devulcanize the caoutchouc and may be used for the regeneration of the same.

It has been found that in the alkaline solutions of viscose the acids of the naphthenes bind the sulphides, thiocarbonates and other impurities containing sulphur without influencing in any way the xanthate. The viscose does not coagulate and the solutions remain homogeneous. They may be used without further treatment for the manufacture of the artificial goods; for instance, they may be spun in acid solutions of salts. The acid of the naphthenes freed from the threads during the spinning process continues to act in the spinning bath and hinders the adverse reactions of the sulphides taking place under ordinary circumstances. The resulting products are smooth and uniform in luster and softness as well as in strength and elasticity.

To carry out this process, the liquid acid of naphthenes, which ought to be free from resin, or preferably the aqueous or alkaline solutions of the salt of the acid, is allowed to flow in and is uniformly mixed with the common alkaline solution of the xanthate. The waste solutions of the petroleum factories represent such an alkaline solution. The acid of naphthenes or its salts may be added to the finished solution of the viscose or to the alkaline water with which the viscose is stirred and diluted.

The quantity of the free acid of naphthenes used depends upon the quantity of  $CS_2$  required for the formation of the xanthate and is about 5 per cent of the latter quantity. The acids of the naphthenes and their sulphur compounds may be separated from the baths in the usual manner, recovered and used again, which renders the process much cheaper. The resulting artificial goods are thereupon washed and treated in the common way.

### Manufacture of Resorcinol

(1,406,745; February 14, 1922)

HARRY McCORMACK, Chicago, Ill.

This relates to the manufacture of resorcinol; and it relates more particularly to a process of preparing resorcinol from benzene disulphonic acid, wherein benzene disulphonic acid, usually in the form of a salt thereof, is reacted upon with caustic alkali, specifically sodium hydroxid or caustic soda, to form the corresponding alkali metal resorcinate, which latter is then treated with the proper amount of mineral acid to set free resorcinol in admixture with an alkali metal salt or salts, such as sodium sulphate and sodium sulphite, said salts being separated in large measure from the resorcinol in the mixture by systematic crystallization, and the separation of the resorcinol from the residual salts still remaining admixed therewith after crystallization being then effected either with the aid of a selective solvent for resorcinol, employed in much smaller quantity than has been indispensable heretofore, or by another procedure by which the use of the selective solvent may be dispensed with altogether.

In the commercial manufacture of resorcinol as heretofore practised, benzene disulphonic acid, or more commonly the sodium salt thereof prepared in a well known manner, is heated with with an excess of caustic soda (sodium hydroxid), the resultant reaction mixture containing sodium resorcinate, sodium sulphite and some unchanged sodium hydroxid. The mixture is then dissolved in a large amount of hot water, and the solution is treated with the requisite amount of a mineral acid, sulphuric acid being commonly employed, or sometimes hydrochloric acid. After the addition of acid, the solution is boiled to drive off sulphurous acid, and after cooling, the solution is filtered to remove tarry matter, and the filtrate is extracted with ether or with some other solvent which is immiscible with water and which is a selective solvent for resorcinol. The ethereal solution of resorcinol is then evaporated, yielding crude resorcinol which may be further purified in various ways.

The known commercial method above described for the manufacture of resorcinol requires the use of a very large quantity of immiscible solvent in order to secure a reasonably complete extraction of resorcinol from the water solution. This is because resorcinol is more soluble in water than in said solvent. The necessity for employing such large quantities of solvent increases the technical difficulties of manufacture, and it is a substantial factor in the cost of the final product.

It is a principal object of the present invention to so alter the customary practice heretofore prevailing as to greatly reduce the amount of selective solvent required for separation of resorcinol from the salts necessarily occurring in admixture therewith at certain usages of its manufacture from benzene disulphonic acid; or optionally to eliminate the use of such selective solvent altogether. A further and general object is to simplify and

cheapen the manufacture of resorcinol by certain novel steps to be explained hereinafter.

In general, the objects of the invention are attained by working with aqueous solutions of resorcinol-containing mixtures of such concentration, that crystallization of the alkali metal salt or salts present may be made to occur as the solutions cool from an initial heated condition. Resorcinol being much more soluble in water than are the alkali salts involved, specifically sodium sulphite and sodium sulphate, it is possible to crystallize large and even major proportions of the salts without accompanying perceptible crystallization of resorcinol. The crystallized salt or salts having been removed from the cooled solution in any suitable manner, the residual concentrated solution of resorcinol still containing a comparatively small amount of admixed salt or salts, may then be evaporated to substantial dryness at a low temperature, under diminished pressure if desired. From the dry residue of mixed resorcinol and salts, resorcinol may be dissolved out by means of a selective solvent for resorcinol, such as benzol, ether, ethyl alcohol, amyl alcohol, or any other solvent which will dissolve resorcinol and which will dissolve resorcinol and which will not dissolve the admixed salt or salts to any substantial extent. It will be noted that by proceeding in this manner, the number of selective solvents possible to employ is comparatively large, since it is not necessary that the solvent be immiscible with water as was the case in customary practice prevailing heretofore. Moreover, only a comparatively small amount of the solvent is necessary to effect substantially complete extraction of the resorcinol from the dry mass treated.

In an alternative procedure, the dry mixture of resorcinol and alkali metal salt or salts can be heated in vacuo to distill off resorcinol, this procedure avoiding the use of any selective solvent.

In the present process, benzene monosulphonic acid is first prepared by the sulphonation of benzol with fuming sulphuric acid which may be made up to a strength of 20 per cent  $\text{SO}_3$ . The sulphonation is carried out by heating the sulphonation kettle with steam and maintaining the temperature of the reaction mixture at around 70 deg. Cent. until the sulphonation to monosulphonic acid is complete. This mixture is then transferred to a jacketed oil-heated pan, the temperature of sulphonation being raised gradually to about 225 deg. Cent. or somewhat higher, at which point the sulphonation to benzene disulphonic acid is complete. The excess sulphuric acid is then neutralized with lime, calcium sulphate is filtered off, and the calcium benzene disulphonate is changed to sodium benzene disulphonate by the addition of sodium carbonate; after which, the precipitated calcium carbonate is filtered out and the solution of sodium benzene disulphonate is evaporated to crystallization. Solid sodium hydroxid is melted in a cast iron pan provided with a stirrer and to the molten sodium hydroxid is gradually added the proper quantity of sodium benzene disulphonate. While the proportions may be varied in practice, it has



been found desirable to use the reagents in the proportion of 250 kilograms of sodium hydroxid to 125 kilograms of dry sodium benzene disulphonate. The mixture is heated at a temperature of 315 deg. Cent. for approximately two hours, at the end of which time the reaction is complete. In the resultant melt are present sodium resorcinol, sodium sulphite, and some unchanged sodium hydroxid.

In practising the process of the present invention, the melt obtained as above described is dissolved in hot water to obtain a concentrated solution from which sodium sulphite will crystallize as the solution cools. In practice, using the weights of sodium hydroxid and sodium benzene disulphonate given in the above specific example, the addition of 600 liters of boiling hot water to the reaction melt has given satisfactory results although it is not intended to limit the practice of the invention to the use of this particular proportion of water. The solution thus obtained is cooled either artificially or by allowing it to cool spontaneously, until the major portion of the contained sodium sulphite has crystallized out. The solution may be separated from the crystals in any suitable manner as by decantation, centrifuging, or other means; and the separated solution consisting mainly of sodium resorcinol and sodium hydroxid is neutralized by adding cautiously the requisite amount of sulphuric acid preferably at about 60 deg. Baume. This results in formation of sodium sulphate and resorcinol. The solution which is hot when the neutralizing action is completed, is then cooled until the major portion of the sodium sulphate crystallizes out, the crystals being removed by decantation, filtration, or centrifuging. The residual solution, which contains a mixture of resorcinol with the comparatively small amount of sodium sulphate that did not crystallize out, and usually containing also some sodium sulphite, is evaporated at low temperature to substantial dryness, employing diminished pressure if desired. The resultant dry powder, consisting chiefly of resorcinol mixed with sodium sulphate, may then be treated for separation of resorcinol in either of two ways, in accordance with the invention. Said dry powder may be extracted with a suitable solvent, such as any of those above mentioned or mixtures of two or more of such solvents, in which the resorcinol is soluble and sodium sulphate and sodium sulphite are substantially insoluble; the solution of resorcinol resulting from the extraction being then evaporated to recover resorcinol, and the solvent also being recovered for re-use. The resorcinol thus obtained may be further purified in known manner by distillation in vacuo. Or, where it is desired to dispense with the use of a solvent altogether, the aforesaid dry powder may be heated in vacuo, resorcinol distilling off, and the admixed sodium sulphate and sodium sulphite (if any) being left as a residue in the still.

### Machine for Spinning, Washing and Dyeing Viscose Threads

(1,408,350: February 28, 1922)

MAURICE DENIS, Paris, France

This invention relates to the manufacture of artificial silk by the viscose process, and has for its object to provide an improved machine for simultaneously spinning, washing and drying the viscose thread in a continuous manner; this machine is of the kind in which the viscose thread, on issuing from each of the squirting nozzles, plunges directly, within a container, having the shape of a test-tube, and surrounding the nozzle, into a coagulation bath traveling, along a closed circuit, in the same direction as the viscose thread.

According to the present invention, the test tube containing the coagulation bath is adjustable vertically with respect to the squirting nozzle, so as to allow of regulating the length of travel of the viscose thread in the coagulation bath, which is an important condition in order to obtain a good coagulation of the thread.

Said arrangement also allows the workmen to collect easily the filaments issuing from the squirting nozzles at the beginning of the manufacture, or to clean, open or replace easily and readily a squirting nozzle, if required.

The accompanying drawing is a vertical cross-section of the improved machine.

The liquid constituting the coagulating bath is brought in the required conditions of temperature, concentration and volume, from the general supply conduit 18 into the lower part of each container 15. It fills this container until the level of the overflow 16 is reached, and it then overflows through the pipes 17 and 22 into the collector 23, whence it is returned, after having been purified, regenerated and reheated, to the feed conduit 18. The flow of the coagulating liquid is regulated by the cock 20, according to the velocity of the issuing filament.

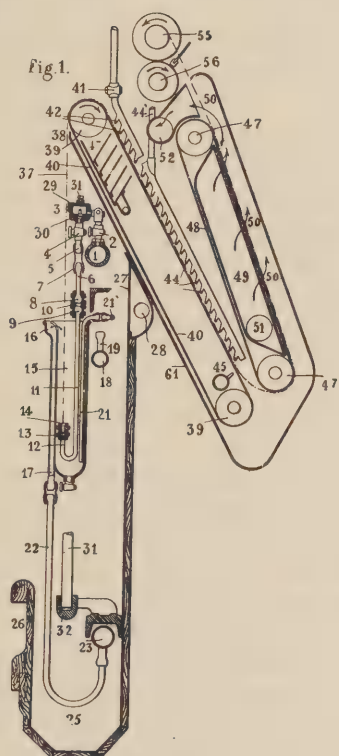
The coagulating bath, in flowing through the coagulating container 15 in the direction of the travel of the viscose thread thus makes a closed circuit, in the course of which it becomes purified, regenerated and made ready for reuse according to the desired temperature.

The solution of viscose, supplied by the pipe 1 in the requisite conditions of concentration, temperature and pressure, is purified in the filter box 3 of the filtering group A or B (according as one or the other of these groups is in operation) and passes through the union 6, the pipe 11—12, and the nozzle 13 carrying the squirting nozzle 14, and squirts into the coagulating bath contained in the container 15.

When it is required to open, clean or replace a squirting nozzle 14, or to collect the filaments at the commencement of the manufacture, the container 15 is lowered so as to leave above the upper level of the nozzle 14 only the minimum height necessary for the coagulation of the filament, and allow the hand labor

of the workmen charged with collecting the first thread to be performed under the best conditions.

For this purpose the glass container 15 is carried by two aluminum collars 35, 36, sliding along guide pillars 31 of aluminum of glass supported by collars or sleeves 33 on the conduit 18. The devices provided for supplying and discharging the coagulating liquid are such that this container 15 can be lowered without the liquid contained therein overflowing therefrom. It can also be kept in a determined position for regulating the length of filament submerged according to the velocity of travel of said filament and therefore regulating the



length of the sojourn of the jet of viscose which is squirted into this medium.

As soon as the thread 37 issuing from the squirting nozzles 14 has been delivered to the drawing devices 38, the container 15 is brought into a position satisfying the conditions for the sojourn of the thread in the medium of the coagulating bath.

The resulting injurious vapors are sucked through a perforated plate 27 by a pipe 28 connected to any suitable suction apparatus.

The thread 37, produced by the union of the filaments issuing from the several orifices of a squirting nozzle 14, is attached in passing to one of the hooks 38 carried by the endless metal web 40, and is drawn along by the latter at a determined speed. The lengths of the metal webs 40 and 48 are determined according to the requirements ascertained by experiment in relation to the coagulation and the complete washing and drying of the viscose thread.

If the first coagulating bath contained in the container 15 has had an insufficient effect upon the viscose thread, the nozzles 42 may spray the thread, as it travels along with the endless web 40 for a determined length and number, with a liquid suitable for completing the coagulation. This liquid will in part be collected by the trough device 43 for the purpose of subsequent regeneration.

The nozzles 44 will likewise suitably wash the coagulated thread under suitable conditions of space and duration. The jet of the inner nozzles 45 will unstick the thread from the metal web 40 and will facilitate the transference from this web 40 on to the endless web 48 upon which it will be dried by the action of a current of hot air supplied through the pipe 51 in the casing 49. The thread is then wound on the bobbin 55.

### Textile Drying Machine

(1,407,081; February 21, 1922)

BERTRAND A. PARKES (assignor to the Philadelphia Drying Machinery Company, Philadelphia, Pa.)

This relates to drying machines employed in drying textile materials and is more especially directed to machines of the above character adapted for drying materials of great length, such as warp yarns, etc. The aim is to so arrange and support the materials, during their traverse through the drying chamber of the machine, as to attain a maximum capacity, with a corresponding increase in efficiency of operation.

The preferred embodiment of the invention includes a feeding mechanism, whereby a series of festoon loops are formed lengthwise and in succession upon supporting bars or poles of an endless conveyor, which is intermittent in its operation. As the supporting bars of the conveyor are brought to the feeding position, an intermittently oscillating feed directs the material in succession on alternate sides of the bars, with resultant formation of the festoon loops; and contemporaneously with this action, a distributing guide determines the pitch or spacing of the loops. Means are also provided for controlling the action of the feeding mechanism so as to form connecting loops between successive conveyor bars and render the operation continuous.

The drawing is an elevation of the receiving end of a drying machine embodying the invention, showing, in addition, the overhead driving means for the feed.

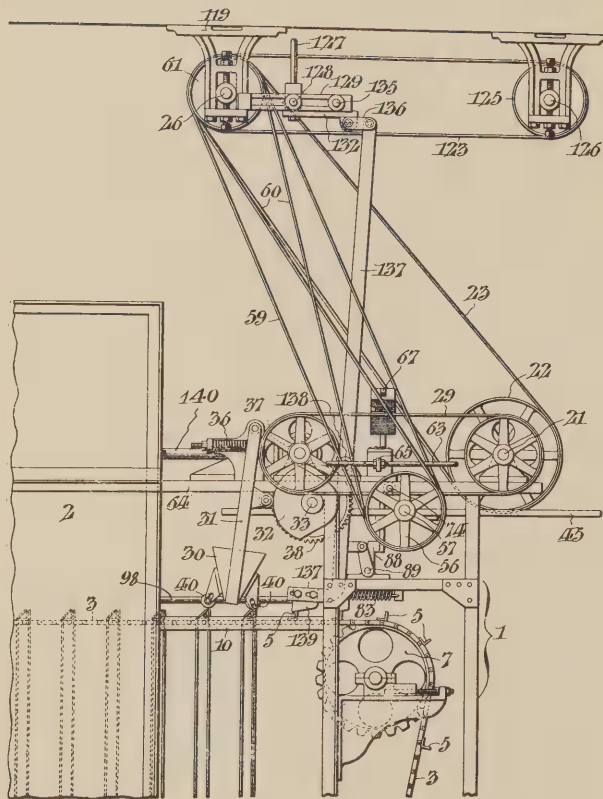
The drying machine illustrated is of well known construction, and may be briefly described as follows:

The framework of the machine consists of a structural iron skeleton, which serves in part to support a series of sheet iron panels forming a rectangular enclosure ordinarily termed a drying chamber. In practice, this chamber is heated by any suitable means such as steam coils, and the heated air within is constantly circulated by suitable fans not shown. Said chamber is traversed by an intermittently operating



conveyor consisting of two spaced endless sprocket chains, to which are attached the lateral supporting bars, preferably of angle iron. These bars are adapted for supporting in festoons, the material to be dried. The chains are driven by sprockets fixed upon a shaft and their circuit is otherwise determined by idler sprockets. In traveling along the active portions of their circuits, these chains are further supported by guides, whereby undue sagging under load is prevented.

The conveyor is driven by means of a ratchet wheel fixed upon the shaft, and actuated by a pawl, carried by a swinging arm, loosely fulcrumed about said shaft. The outer end of the arm, is coupled by means of a connecting rod, with a crank disk, fixed upon a counter



shaft, which is journaled in suitable bearings, supported by an out-structure forming part of the skeleton of the machine. This shaft is constantly rotated by power transmitted from any convenient source to a sprocket wheel thereon. The pawling of the ratchet wheel is governed by a controlling mechanism.

Claims are granted as follows:

1. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars, and means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor and means for reversing the movement of said guide controlled by its progress in each direction.

2. A drying machine comprising a traveling con-

veyor with a plurality of transverse supporting bars, and means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor and means for reversing the movement of said guide controlled by its progress in each direction and by the movement of the conveyor.

3. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor; and means controlled by the back and forth movement of said guide for producing movement of the conveyor.

4. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor and means for reversing the movement of said guide controlled by its progress in each direction; and means controlled by said reversing means for producing movement of the conveyor.

5. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar; and the means controlled by movement of the conveyor for feeding the material to said festooning means.

6. A drying machine comprising an intermittently advancing conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, and means for feeding the material to said festooning means while the conveyor is at rest and interrupting such feed during its periods of motion.

7. A drying machine comprising an intermittently advancing conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide movable back and forth transversely of the conveyor; means for moving said guide transversely while the conveyor is at rest and interrupting its movement while the conveyor is in motion; and means for feeding the material to said festooning means while the conveyor is at rest and interrupting such feed during its periods of motion.

8. A drying machine comprising a traveling conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar including a guide movable back and forth transversely of the conveyor; means con-

trolled by the back and forth movement of said guide for producing movement of the conveyor, and by movement of the conveyor for producing back and forth movement of said guide; and means controlled by movement of the conveyor for feeding the material to said festooning means.

9. A drying machine comprising an intermittently advancing conveyor with a plurality of transverse supporting bars; means for festooning the material to be dried successively on said bars in a plurality of loops arranged lengthwise of each bar, including a guide moving back and forth transversely of the conveyor; means for producing movement of the conveyor and for reversing the movement of said guide actuated as a result of progress of the latter in each direction; and means for rendering said reversing means ineffective during movement of the conveyor.

10. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars; and a feed screw for actuating said distributing guide.

11. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide and a drive for the said screw automatically reversible under the control of the distributing feed.

12. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide; a reversible drive for the said distributing feed, including tight and loose pulleys associated with said screw; and open and crossed driving belts, and shifting means for automatically interchanging said belts in alternation upon said tight pulley under the control of said distributing guide.

13. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide; a reversible drive for the said distributing feed, including tight and loose pulleys associated with said screw; open and crossed driving belts and a shifting bar for interchanging said belts on the tight pulley; a pivoted lever for actuating said shifter, said lever having a weighted and capable of automatically

swinging to opposite sides of the pivot after being set in a position slightly beyond the neutral in either direction; and means automatically controlled by the distributing guide for setting said weighted lever.

14. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; means for feeding and distributing the materials to be dried, including a guide operative longitudinally with respect to the conveyor bars and a feed screw for actuating said distributing guide; a reversible drive for the said distributing feed, including tight and loose pulleys associated with said screw; open and crossed driving belts, and a shifting bar for interchanging said belts on the tight pulley; a pivoted lever for actuating said shifter, said lever having a weighted end capable of automatically swinging to opposite sides of the pivot after being set in a position slightly beyond the neutral in either direction; means automatically controlled by the distributing guide for setting said weighted lever; and means controlled by the conveyor for temporarily restraining the action of the weighted lever to prevent the shifting of the said belts during the progression of the conveyor.

19. A machine of the class described, including a drying chamber; an intermittently operative conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; devices for feeding the materials to be dried; driving means for said feeding devices, including a shaft having tight and loose pulleys, a driving belt for said pulleys; a belt shifter; and an operating lever for said shifter lying in the path of the conveyor bars and co-operating with them to cause the belt to be shifted to the idle pulley to render the feeding devices inoperative during the motion of the conveyor.

20. A machine of the class described, including a drying chamber; an intermittently operative conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; a reciprocating guide for feeding the materials longitudinally to the conveyor bars; driving means for the conveyor comprising a ratchet wheel, a continuously oscillating arm, and a pawl carried by said arm and normally inactive upon said ratchet; and means actuated by the reciprocating feed at the end of its travel in either direction for rendering the pawl of the conveyor drive active.

21. A machine of the class described, including a drying chamber; an intermittently operative conveyor traversing said drying chamber; a series of transverse supporting bars carried by said conveyor; a reciprocating guide for feeding the materials longitudinally to the conveyor bars; driving means for the conveyor comprising a ratchet wheel, a continuously oscillating arm, and a pivoted pawl carried by said arm and having a weighted extension normally maintaining said pawl in inactive position; a stop for engaging the



weighted extension of the pawl; a cam for shifting said stop into the path of the weighted arm of the pawl; and means actuated by the said reciprocating guide at the end of its travel in either direction for controlling said cam to effect the pawling of the latter.

22. A machine of the class described, including a drying chamber; a conveyor traversing said drying chamber; a series of transverse supporting bars carried by the said conveyor; means for intermittently driving said conveyor; a feed for the material to be dried; a reciprocating guide for distributing the material longitudinally of the conveyor bars while directed thereto by the feed; driving means common to the feed and the distributing guide; and means controlled by the conveyor for rendering the said common driving means for the feed and the guide idle during the progression of the conveyor.

### Foreign Dyes Licensed by Treasury Department for March Import

**Total Is 45,654 Pounds Less than February's; Germany and England Off Slightly; France Sends First Shipment Since Last October; Switzerland Gains**

**L**ICENSED imports of dyestuffs for March, which totaled 254,615 pounds, showed a falling off from the February importations, which were but 300,269 pounds. This is likewise a loss from the 308,787 December total.

Germany, leader for the month, undershot her February mark of 161,012 pounds by sending us 134,784 pounds in March. England showed the greatest percentage decrease by falling all the way from 25,500 pounds in February to but 3,650 pounds in March. France, on the other hand, came back into the field with a contribution of 1,625 pounds—the first she has sent here since October, when 880 pounds was the total. Switzerland recorded a not too substantial gain by increasing her February total of 113,757 pounds to 114,556 pounds.

Following is the complete list, giving the types and quantities of dyestuffs for the importation of which into the United States licenses were granted by the Treasury Department, Division of Customs, Dye and Chemical Section, during March. The tabulation is being issued by the American Dyes Institute, and it is announced that anyone interested in the manufacture of dyestuffs who has not received a copy may obtain one by application to that organization's headquarters, 320 Broadway, New York City.

An appended note by the Treasury Department states: "Licenses shown by this list to have been issued for particular commodities must not be considered as a precedent or assurance that favorable action will be taken on future applications for similar commodities. The Treasury Department, Dye and Chemical Section, announces in special cases that it is

its practice to consider any special evidence that may be submitted by manufacturing consumers of dyestuffs tending to prove that the American commodity, while satisfactory in general or for some lines, will not meet the requirements as to quality or adaptability for particular manufacturing purposes."

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Aceto Purpurine 8B.....	1,200	....
Acid Alizarine Gray G.....	739	....
Acid Anthracene Brown RH Ex. Pdr.	500	....
Acid Chrome Blue 2R.....	10	....
Acid Cyanine BF.....	500	....
Acid Green B Conc.....	9	....
Acid Rhodamine BG.....	200	....
Acid Rhodamine R.....	....	660
Acid Rhodamine 3R.....	....	660
Acid Violet BW.....	300	....
Acid Violet N.....	100	....
Acridine Red B.....	25	....
Acridine Red 3B.....	25	....
Acridine Orange GG.....	25	....
Acridine Orange NO.....	25	....
Acridine Scarlet R.....	25	....
Acridine Scarlet 2R.....	25	....
Acridine Yellow G.....	25	....
Acridine Yellow R.....	25	....
Algol Brilliant Red 2B Paste.....	200	....
Algol Brilliant Violet 2B Powder...	30	....
Algol Brilliant Violet R Paste.....	300	....
Algol Brown G.....	130	....
Algol Brown R Paste.....	286	....
Algol Brown R 12½% Paste.....	25	....
Algol Olive R Powder.....	50	....
Algol Red B.....	2,000	....
Algol Red FF Extra Paste.....	200	....
Alizarine Astrol B.....	650	....
Alizarine Black T.....	45	....
Alizarine Blue S.....	3,000	....
Alizarine Blue SAE.....	300	....
Alizarine Blue SAP.....	72	....
Alizarine Blue SB 45% Conc. 50....	390	....
Alizarine Blue SKY.....	575	....
Alizarine Blue SW Powder.....	5	....
Alizarine Blue Black B.....	2,700	....
Alizarine Blue Black 3B Powder...	1,000	....
Alizarine Blue Black BT Powder...	500	....
Alizarine Bordeaux BD or GG.....	45	....
Alizarine Cyanine GG Powder.....	1,000	....
Alizarine Cyanine Green G Ex. Pdr..	530	....
Alizarine Cyanine Green G Extra...	25	....
Alizarine Direct Blue B.....	100	....
Alizarine Fast Gray 2BL.....	35	....
Alizarine Geranole B.....	25	....
Alizarine Isol R.....	650	....
Alizarine Light Blue SE.....	....	1,100
Alizarine Orange AO 20% Paste	....	....
(from England 1,800 lbs.).....	....	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)	Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Alizarine Orange R Powder.....	50	....	Brilliant Sky Blue 2RM.....	5	....
Alizarine Red Yellow Shade.....	200	....	Brilliant Wool Blue FFR Extra.....	50	....
Alizarine Red S Powder.....	1,720	....	Capri Blue GON.....	25	....
Alizarine Red SX 20% Paste.....	5,000	....	Chinoline Yellow Soluble in Spirit..	85	....
Alizarine Red W Powder.....	750	....	Chinoline Yellow .....	2,000	....
Alizarine Rubinole 3G.....	10	....	Chloramine Brilliant Red 8B.....	....	100
Alizarine Rubinole R.....	5,485	....	Chloramine Red B.....	....	1,000
Alizarine Rubinole GW Powder....	5,900	....	Chloramine Red 8B.....	....	3,100
Alizarine Saphirol B.....	1,600	....	Chloramine Red 8BS.....	875	....
Alizarine Saphirole SE Powder....	1,000	....	Chlorantine Fast Blue 2GL.....	....	2,398
Alizarine Saphirole SE Conc.....	225	....	Chlorantine Fast Blue RL.....	....	1,100
Alizarine Saphirole WSA Powder...	1,000	....	Chlorantine Fast Bordeaux BL.....	....	660
Alizarine Sky Blue B.....	5,610	....	Chlorantine Fast Bordeaux 2BL....	....	1,100
Alizarine Uranol 2B.....	160	....	Chlorantine Fast Brown RL.....	....	660
Alizarine Viridine FF Paste.....	5,450	....	Chlorantine Fast Red 7BL.....	....	510
Anthosine 3B .....	100	....	Chlorantine Violet 4BL.....	....	286
Anthracene Blue SWB Powder.....	500	....	Chlorantine Fast Violet 2RL.....	....	880
Anthracene Blue SWGG Ex. Pdr...	600	....	Chlorantine Fast Yellow RL.....	....	880
Anthracene Blue WB Paste.....	1,500	....	Chlorazol Fast Red K (from England	....	....
Anthracene Chromate Brown EB...	1,050	....	500 lbs.) .....	....	....
Anthracyl Chrome Green.....	440	....	Chrome Azurol S.....	....	1,000
Anthraflavone G Paste.....	100	....	Chrome Brown TV.....	....	1,100
Anthraflavone GC Paste.....	2,325	....	Chromaxan Brilliant Blue G.....	30	....
Anthraquinone Blue SR Ex. Pdr....	10	....	Chromaxane Violet B.....	10	....
Anthraquinone Green GXNO.....	10	....	Ciba Blue 2B Powder.....	....	420
Anthraquinone Violet .....	20	....	Ciba Blue 2BD Paste.....	....	10,890
Azo Carmine GX.....	250	....	Ciba Blue G Powder.....	....	3,040
Azure Blue BK .....	200	....	Ciba Bordeaux B Powder or Paste..	....	1,100
Alizarine Cyanine Green E.....	100	....	Ciba Green G Powder or Paste.....	....	440
Benzo Brilliant Blue 8G Extra.....	100	....	Ciba Orange G Paste.....	....	1,109
Benzo Fast Blue G.....	100	....	Ciba Red G.....	....	1,540
Benzo Fast Blue 4GL.....	2,850	....	Ciba Red R.....	....	2,695
Benzo Fast Bordeaux 6BL.....	110	....	Ciba Scarlet G Powder.....	....	220
Benzo Fast Gray.....	200	....	Ciba Scarlet G Powder 20% Paste..	....	3,300
Benzo Fast Gray BL.....	100	....	Ciba Violet B Powder.....	....	484
Benzo Fast Heliotrope BL.....	352	....	Ciba Violet B Paste.....	....	2,640
Benzo Fast Heliotrope 2RL.....	115	....	Ciba Violet R Paste or Powder.....	....	2,200
Benzo Fast Orange 2RL.....	115	....	Cibanone Blue 3G Paste or Powder.	....	2,501
Benzo Fast Red 8BL.....	1,030	....	Cibanone Green B Paste.....	....	330
Benzo Pure Yellow 6G Extra.....	150	....	Cibanone Orange R Paste.....	....	7,568
Benzo Red 12R.....	1,250	....	Congo Orange G.....	5	....
Benzo Rhoduline Red B.....	100	....	Coreine RR Powder.....	....	50
Brilliant Acid Blue FF.....	550	....	Cresyl Blue BB.....	25	....
Brilliant Azurine 5G.....	550	....	Cresyl Fast Violet 2B.....	25	....
Brilliant Benzo Fast Helio BL.....	25	....	Cross Dye Green 2G Conc. (from	....	....
Brilliant Benzo Fast Heliotrope 2RL	50	....	England 1.350 lbs.).....	....	....
Brilliant Benzo Fast Violet BL.....	235	....	Crystal Violet Extra.....	200	....
Brilliant Benzo Green B.....	500	....	Cyananthrol BGAOO .....	1,848	....
Brilliant Benzo Violet B.....	50	....	Cyananthrol 3G .....	300	....
Brilliant Benzo Violet 2R.....	100	....	Cyanine B .....	200	....
Brilliant Cresyl Blue BBS.....	25	....	Cyanole Extra .....	600	....
Brilliant Geranine BBN.....	400	....	Cyanole FF .....	2,065	....
Brilliant Indigo B Paste.....	600	....	Delta Purpurine 5B.....	940	....
Brilliant Indigo G Paste.....	400	....	Developer Z .....	100	....
Brilliant Milling Blue B.....	100	....	Diamine Brilliant Scarlet S.....	672	....
Brilliant Rose G.....	25	....	Diamine Catechine B.....	25	....
Brilliant Sky Blue 8G Extra.....	2,050	....	Diamine Catechine G.....	200	....



Designation of Dye	Germany (lbs.)	Switz. (lbs.)	Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Diamine Catechine 3G.....	10	....	Helindone Violet R Paste.....	70	....
Diamine Fast Bordeaux 6BS.....	120	....	Hydron Blue G 20% Paste.....	510	....
Diamine Fast Brown G.....	220	....	Hydron Blue G.....	200	....
Diamine Fast Orange EG.....	125	....	Hydron Blue R 30% Paste.....	10	....
Diamine Fast Orange ER.....	500	....	Hydron Pink FF Paste.....	100	....
Diamine Fast Red 8BL.....	1,300	....	Indanthrene Black BB Dble. Paste..	5,000	....
Diamine Heliotrope G.....	600	....	Indanthrene Blue BCS Powder.....	710	....
Diamine Orange G.....	100	....	Indanthrene Blue RS Triple Pdr. ...	750	....
Diamine Orange F.....	50	....	Indanthrene Blue RSP Triple Pdr. ...	325	....
Diamine Scarlet B.....	1,015	....	Indanthrene Blue WB Powder.....	20	....
Diamine Scarlet B 130%.....	155	....	Indanthrene Blue Green B Dbl. Pst.	805	....
Diamine Yellow N 110%.....	300	....	Indanthrene Bordeaux B Ex. Paste.	1,000	....
Diamond Green SS.....	600	....	Indanthrene Claret B Paste.....	500	....
Diazanil Pink B.....	10	....	Indan. Golden Orange G. Single Pst.	1,100	....
Diazo Bordeaux 7B.....	110	....	Indan. Golden Orange G Dbl. Pst..	510	....
Diazo Brilliant Black B.....	500	....	Indan. Golden Orange G Dbl. Pst. SF	500	....
Diazo Brill. Scarlet 2BL Ex. Conc...	300	....	Indan. Golden Orange RRT Paste..	1,956	....
Diazo Brilliant Scarlet 6B Extra....	600	....	Indan. Golden Orange RRT Dbl. Pst.	2,665	....
Diazo Brilliant Scarlet G Extra.....	10	....	Indanthrene Red BN Paste.....	500	....
Diazo Fast Violet BL.....	112	....	Indanthrene Scarlet GS Powder....	220	....
Diazo Fast Yellow 2G.....	100	....	Indanthrene Violet B Extra.....	100	....
Diazo Indigo Blue 4GL Extra.....	15	....	Indanthrene Violet RR Ex. Powder.	25	....
Diazo Indigo Blue 4GL.....	10	....	Indanthrene Yellow GN Extra.....	25	....
Diazo Indigo Blue 2RL.....	500	....	Janus Red B.....	200	....
Diazo Light Red 7BL.....	15	....	Katigen Green 2G.....	1,000	....
Diazo Sky Blue B.....	10	....	Lanasol Blue B.....	....	1,100
Diazo Sky Blue 3G.....	10	....	Lanasol Brown 2R.....	....	330
Direct Brown 2G.....	....	1,100	Malta Gray J (from France 1,100 lb.)	....	....
Erika B Extra.....	1,565	....	Metachrome Blue Black 2BX.....	500	....
Erika GN.....	50	....	Milling Yellow O.....	250	....
Erio Carmine 2BC.....	....	1,000	Mimoza Z Conc.....	....	1,000
Erio Chrome Azurol BX.....	....	7,700	Naphtha Chrome Azurine B.....	....	1,210
Erio Chrome Brown ROS.....	....	1,500	Naphtha Chrome Violet R.....	....	220
Erio Chrome Flavine A Conc.....	....	2,000	Naphthamine Blue JEF.....	250	....
Erio Chrome Red B.....	....	2,000	Naphthogene Blue B.....	1,000	....
Erio Chrome Verdon S.....	....	4,750	New Victoria Blue B.....	450	....
Erio Chrome Violet 3B.....	....	1,000	Nitrosamine Red Paste.....	3,000	....
Euchrysine GRNTN.....	100	....	Omega Chrome Brown PB.....	....	1,000
Euchrysine RRD.....	100	....	Oxamine Black BBNX.....	500	....
Fast Bordeaux Benzo 6BL.....	25	....	Oxamine Developer H Conc.....	500	....
Fast Green Extra Bluish.....	700	....	Palatine Black 4BXX.....	50	....
Fast Mordant Yellow G.....	10	....	Palatine Light Yellow RX.....	10	....
Fastigen B.....	125	....	Palatine Yellow RX.....	10	....
Fraise (from France 500 lbs.).....	....	....	Paper Fast Bordeaux B.....	3,500	....
Geranine B.....	15	....	Parme Soluble in Alcohol.....	10	....
Geranine G.....	200	....	Patent Blue AS.....	....	660
Hansa Yellow G Lumps.....	500	....	Patent Phosphine G 300%.....	....	1,100
Helindone Blue 3GN Powder.....	100	....	Patent Phosphine M.....	....	1,100
Helindone Brown G Paste.....	249	....	Patent Phosphine R.....	....	110
Helindone Brown 2R Paste.....	1,000	....	Phosphine 3R.....	660	....
Helindone Orange R Paste.....	5	....	Pluto Black A Extra.....	212	....
Helindone Pink AN.....	1,403	....	Pluto Black G.....	100	....
Helindone Pink BN.....	1,700	....	Pluto Black G Extra.....	112	....
Helindone Pink R Extra Paste.....	440	....	Pluto Brown 2G.....	700	....
Helindone Pink RN.....	1,000	....	Pyrazole Orange G.....	....	4,440
Helindone Red 3B Paste.....	500	....	Pyrogene Cutch GG.....	....	660
Helindone Rose B Extra.....	25	....	Pyrogene Direct Blue RL.....	....	3,300
Helindone Violet R Powder.....	40	....	Pyrogene Green 3G.....	....	2,448

Designation of Dye	(lbs.) Germany	(lbs.) Switz.
Rhodamine 6GDN Extra.....	225	....
Rhodamine 6GH Single.....	....	660
Rhodamine 6HG .....	....	55
Rhoduline Red Benzo B.....	100	....
Rosanthere B .....	....	1,100
Rosanthere Bordeaux B.....	....	180
Rosanthere Orange R.....	....	121
Roselane Paste (from France 25 lbs.)	....	....
Rosinduline GFX .....	225	....
Royal Blue No. 1048K.....	1,000	....
Sambesi Black F.....	500	....
Sericose L (Developer).....	10	....
Setocyanine .....	....	1,500
Silk Blue BT5BOO.....	506	....
Sulphon Orange G.....	20	....
Sulphur Brown CL4R.....	5	....
Sulphur Brown CLG.....	25	....
Sulphur Corinth CLB.....	5	....
Supramine Black BR.....	250	....
Supramine Brown R.....	250	....
Supramine Yellow R.....	100	....
Thioflavine TCN .....	20	....
Thioflavine T .....	188	....
Thiogene New Blue 2RL Ex. Conc..	37	....
Thiogene New Blue 2RL.....	44	....
Thio Indigo Rose RN Extra Paste..	10	....
Thio Indigo Scarlet G Paste.....	110	....
Thio Indigo Scarlet 2G Paste.....	10	....
Thional Brilliant Green GG.....	....	700
Toluylene Red .....	1,100	....
Triazol Red B.....	....	1,100
Trisulphon Brown B.....	....	6,000
Trisulphon Brown GG.....	....	2,500
Trisulphon Brown GG Conc.....	....	2,000
Ursol SA .....	56	....
Ursol SB .....	56	....
Vat Pink B Extra.....	100	....
Vat Pink R Extra.....	100	....
Victoria Blue BO Pure.....	542	....
Wool Fast Blue BL.....	858	....
Wool Fast Blue GL.....	550	....
Xylene Cyanol FF Extra.....	....	1,200
Zambesi Pure Blue 4B.....	50	....
Carmine 1763H .....	10	....
Madder Lake No. 70 Extra.....	40	....
Permanent Red No. 744H.....	100	....
Permanent Violet No. 33.....	50	....
Permanent Violet No. 2836Z.....	50	....
Fast Violet Lake F1170.....	100	....
Viridin Green .....	210	....
Totals:		
Germany .....	134,784	
England .....	3,650	
France .....	1,625	
Switzerland .....	114,556	
Grand Total .....	254,615	

## LICENSE REQUIREMENTS FOR IMPORTATION OF SYNTHETIC ORGANICS

So much annoyance, and delay sometimes arises from the importation of synthetic organics without first securing a license to import, that J. A. Hynes, a chemist in the U. S. Custom Service, believes it opportune to set forth briefly, for the benefit of the trade in general, the requirements for the importation of these products.

For a considerable period there has been required a license to import "Coal Tar Derivatives," and this requirement was pretty well understood by importers who applied to the War Trade Board for their licenses. With the advent of the Emergency Tariff Act (effective May 27, 1921) the license requirement was extended to cover "Synthetic Organic Chemicals" (with certain exceptions) and the authority to grant license transferred from the War Trade Board to the Secretary of the Treasury --which brings the details within the scope of the Collector of Customs. On July 21, 1921, the Assistant Secretary of the Treasury issued under Treasury Decision 58799 instructions for the guidance of appraisers and collectors. It is possible to give here only such an outline of this decision as will call the attention of importers --actual or prospective--to the necessity of a license. Details may be obtained from the decision itself or by applying to the Collector of Customs, or to any Custom House broker.

1. The terms "synthetic organic chemical and synthetic organic drug" . . . are interpreted to apply to any substance which is known commercially as a chemical or drug and which *contains carbon in chemical combination with other elements* (excepting cyanides, cyanamides, carbides, carbonates, and bicarbonates of the metals or inorganic radicals) and which has been produced by any chemical process other than that necessary to extract, isolate, or purify the substances from a natural source or effect its separation from a more complex natural compound by hydrolysis or to form a salt.

2. Products obtained by fermentation if such fermentation is carried on under controlled conditions, are considered to be synthetic organic chemicals. . . . Fractional distillation of natural substances does not make a synthetic chemical . . . destructive distillation does.

2. . . .

4. In cases where substance may be either natural or synthetic . . . it is assumed to be synthetic if it is known that the substance is of a substantial commercial quantity.

5. . . . if the product is obtained both synthetically and otherwise, an affidavit of the manufacturer stating clearly the process of manufacture of the product may be submitted with the invoice by the importer.

6. . . . mixtures in part of coal-tar origin . . . considered same as if wholly coal-tar origin.

7. . . .

8. It is held that the wording of the act includes natural dyes and dyestuffs.

In a later decision (1. D. 38806) there is submitted a list of Synthetic Organics and "Not Synthetic Organics." This may serve as a guide to importers. The synthetics



include formic, lactic, oxalic, pyrogalllic, acetic, valerianic acids, and all salts of these acids; acetic anhydride, acetone, acetone oil, formaldehyde, chloral hydrate, urea, dionin, terpin hydrate, carbon tetrachloride, chloroform, cellulose esters, amyl acetate and nitrite, ethyl acetate and chloride, sulphuric ether butyl alcohol, iodoform, heroin, peronin, calcium, cacodylate, mercury cacodylate, etc. The "Not Synthetic" lists includes citric, gallic, tannic, tartaric, prussic, glycerophosphoric acids, and all metallic or inorganic radical salts of these acids; thymol, glycerine, sulphocyanides of metals, cocaine, morphine, menthol, and bismuth albuminate. The foregoing are merely representative exhibits. The chemist will know at once from the definition given under No. 1, whether a license will be required or not.

Apply to the Collector of Customs at the nearest port for appropriate application and directions for filing same (in Chicago, apply at the fourth floor, south wing of Federal Building).

It is advisable to obtain a license before placing an order. Otherwise one may find when the merchandise arrives that a license will not be granted—with resulting embarrassment and loss.

### **ALLIED CHEMICAL AND DYE CORP. EARNS \$2.27 ON COMMON SHARES**

#### **Net Income for 1921 Amounts to \$7,646,909 — Bank Indebtedness Entirely Liquidated**

Allied Chemical & Dye Corporation, for 1921, shows, after deducting all charges, including taxes, a net income of \$7,646,909, equivalent to \$2.27 a share on the outstanding 2,169,439 common shares, after allowing for preferred dividends.

Gross income of the corporation and subsidiaries amounted to \$13,093,889. Reduction of inventories to cost or market, whichever was lower, as of December 31, last, caused a reduction in income of \$3,940,557, while the loss resulting from sale of securities brought about a further decrease of \$773,413, a total of \$4,713,970, and creating a net income prior to Federal taxes of \$8,379,918. Taxes amounted to \$733,009.

Dividends paid during the year aggregated \$11,356,834, consisting of \$2,706,107 preferred and \$8,650,727 for the common, thus creating a final deficit for the year of \$3,609,905. This caused a drop in the total surplus as of the close of last year, to \$122,659,080, which compared with \$126,369,005 on December 31, 1920.

William H. Nichols, chairman of the board, in his report to stockholders, calls particular attention to the strength of the company's current financial position. The bank indebtedness of \$11,100,000 outstanding at the close of 1914, was completely liquidated during 1921, so that at the end of the year the company had no current indebtedness beyond trade accounts, accrued wages and declared dividends.

The balance sheet discloses an excellent position. Cash holdings substantially exceed the aggregate of current liabilities. Total current assets at the close of the year were \$74,711,560, inclusive of \$11,931,284 cash, while current liabilities totaled only \$8,285,909, leaving a net working capital of \$66,425,651.

Mr. Nichols' report adds:

As anticipated, the serious depression of business in general during 1921 caused a corresponding reduction in the volume of this company's business during the year, which is reflected in the earnings. There has been, however, a gratifying increase in the demand for the company's products, coincident with the recent improvement of business in general.

In determining net income for 1921, as for 1920, inventories at the end of the year have been reduced to cost or market value, whichever was lower, and ample provision has been made for depreciation, as evidenced by the increase in the depreciation reserve. The item of organization expense was also charged against the year's operations.

Particular attention is called to the strength of the company's current financial position. The bank indebtedness of \$11,100,000 at December 31, 1920, was completely liquidated during 1921, so that at the end of the year the company had no current indebtedness beyond trade accounts, accrued wages and declared dividends.

It will be noted that most of the \$4,638,940.67 minority stockholders' interests outstanding at December 31, 1920, were acquired during 1921, leaving \$1,200,994.82 outstanding at the end of the year—approximately one-half of one per cent. The company did not issue any additional stock during the year except for acquisition of additional stock of subsidiary companies.

The company's most conspicuous technical development during the year was to establish successfully, on an industrial scale, the manufacture of anhydrous ammonia directly from the nitrogen of the air. The company's new plant for this purpose has been running steadily at capacity since it was completed last fall and is the first of its kind to be successfully operated in this country.

The Velvet Textile Corporation, 140 Market Street, Paterson, N. J., has recently incorporated to provide mortgage, lease, sell, and in all ways use and operate factories and machinery for the manufacture and sale of velvets and plushes, and all other kinds of fabrics. The total stock is \$200,000, two thousand shares of \$100 par value. The shareholders are Clifford L. Newman, Julia V. Many and Ethel Carnathian.

## DECLARES RUSSIAN TEXTILE INDUSTRY IS PRACTICALLY WIPED OUT BY SOVIET RULE

The disorganization of Russian industry caused by Communist experiments has affected all the branches of the textile industry very seriously, according to Charles Goodlet, in the "Textile Manufacturer." The present condition of the textile industry is such that, strictly speaking, the industry can hardly be said to be working at all. Only 0.7 per cent of the spindles in the mills are in operation.

The first few months of 1921 showed a certain improvement in the situation as compared with 1920, but since April the production of all textile factories has declined rapidly, and by the beginning of last summer the output fell below the figure for the corresponding period of 1920.

The principal cause of the small output of all branches of the textile industry is the lack of fuel. The fuel crisis in Soviet Russia was very acute at the beginning of this year, as the reserves of all kinds of fuel which had been accumulated before the advent of the Bolsheviks were exhausted. The shortage of fuel affected all industries. According to the "Ekonomicheskaya Zhizn" (April 23), the effect on the textile industry was as follows: The shortage of fuel resulted in the closure of 77 per cent of the cotton mills, 69 per cent of the flax mills, 53 per cent of the silk mills, and 70 per cent of the woolen mills. The shortage was a consequence of the whole economic system of the Soviets. Owing to the insufficient wages offered, the Bolsheviks were unable to find a sufficient number of workmen even for the simple task of hauling timber from the forests.

Apart from the lack of fuel, the textile industry was greatly embarrassed by the shortage of labor. By the beginning of 1921 there were already four vacancies in the textile mills for one workman seeking employment. At the present time, when the number of mills in operation has decreased from four to six times as compared with the beginning of this year, this shortage of labor may not be felt. There is no real work at the factories. It is impossible to open all the textile mills, because there would not be enough operatives for all. The shortage of mill hands is due to the same cause as the absence of workmen in the fuel industry—i. e., the inadequacy of the wages offered as compared with the cost of living.

The two factors above mentioned are the fundamental causes of the paralysis of the Russian textile industry, nationalized by the Soviet Government. Moreover, they are the direct consequence of the very construction of the Soviet system, and cannot be removed without radically altering the system. For the first seven months of 1921 the results were as follows:

**Cotton Industry.**—Out of a total of 7,000,000 spindles in Soviet Russia, only 900,000 spindles (in thirty-six mills) were at work during the first three months of 1921. In April, May and June there was a great decrease in the number of spindles, and in July it fell to 48,033, which forms 0.7 per cent of the number of spindles it was pro-

posed to use, and 0.7 per cent of the total number at the disposal of the Bolsheviks. During the first half of July only twelve cotton mills were working, and in the second half of that month only six (out of a total of 90). From private information it appears that by the beginning of autumn only the Tver Cotton Mills were working.

The present territory of Russia contains about 200,000 weaving looms, of which approximately 25,000 were working at the beginning of 1921, but during the second quarter of the year there was an abrupt decline, the number of looms working in July being only 1570, or 11.4 per cent of the number it had been proposed to use.

Of course, even prior to the catastrophic decline of production the output of cottons at the Soviet factories did not satisfy even one-tenth of the requirements of the population. Before the Revolution the Russian factories now in the hands of the Bolsheviks used to produce more than 2,000,000,000 arshins of cotton textiles; now the output will hardly reach 150,000,000 arshins.

**Woolen Industry.**—No better results have been obtained at the woolen mills. It was proposed to produce 37,000,000 arshins of woollens in the course of the year, but, according to the report read at the Textile Congress, for the first six months the output of primary textiles was 7,200,000 arshins. According to the program, eighty-seven mills, with 192,000 spindles, were to have been working. By April, however, sixty-one mills had to close down for lack of fuel. Then the number of mills still working was further reduced—viz., to sixteen in the first half of July, and to four in the second half, with 13,510 working spindles.

For the first half of 1921 the total output was about 25 per cent of the pre-war figure. Every month, however, the output of the woolen mills kept decreasing, and in July it was less than 5 per cent of the pre-war monthly average. The woolen mills are likewise very short of raw material. Next year there will be no more wool.

The catastrophic decline in the production of the factories throws the question of raw material into the background. If the output does not exceed the figure for July the present stocks of wool will last for a long time.

**Flax Mills.**—The output for the first half of 1921 was less than that for the same period of 1920. Owing to lack of fuel in April only eighteen out of sixty-six flax mills were working, and subsequently, in July, the number decreased to two.

The silk and hemp mills are in no better condition. In July, out of a total of forty-five silk mills, only two were working, with an aggregate of thirty-six looms (the total number of looms in the silk mills is over 8,500).

Seven of the seventeen hemp mills were closed down in April for want of fuel.

Such is the condition of the Russian textile industry. Only the restoration of normal economic conditions—under which the workers would be interested in obtaining employment, and the employers in successful production—could bring new life into the textile and all other Russian industries. The Bolsheviks are fully aware of this. They have already offered to lease industrial undertak-



ings to the former owners. So far, there has been practically no response. A great deal of money would be required for repairs. Will anyone be found foolish enough to invest money in a country whose Government does not acknowledge private property, and where there is a minimum of law and order, and where the power of life and death over everyone is vested in extraordinary commissions composed of the most shady elements of the community?

#### DU PONT ANNOUNCES PONTACYL SULPHON BLUE R, PONTACHROME BROWN G AND PONTAMINE SCARLET B

There have been recent additions to the line of colors as offered by E. I. du Pont de Nemours & Co., and these are represented in Pontacyl Sulphon Blue R, an acid blue that is greatly in demand by the woolen trade for producing of Navies, and used because of its very desirable brightness of shade, and excellent solubility.

An addition has been made to their chrome line by adding Pontachrome Brown G. With this new color, it makes their Brown range very complete, giving the consumer almost any of the shades from the yellowest to the reddest.

To their line of Fast Cotton Reds has been added Pontamine Scarlet B, a product characterized by excellent solubility and level dyeing properties. This makes it very adaptable for use in light salmon shades; and can be very readily discharged on both cotton and silk, giving a clear white. When dyed in union work it leaves wool white.

#### DYE PRODUCTS & CHEMICAL COMPANY ADOPTS BRAND NAME "DYELENE"

The Dye Products & Chemical Company, Inc., will, in the future, according to an announcement, put out all their products under the brand name "Dyelene." The company manufactures various dyes and intermediates and will continue to maintain the high standard of quality and dependability under the brand "Dyelene," as in the past.

The various dyes and intermediates now manufactured by the company are as follows:

Dyelene Fast Acid Green, Dyelene Naphthol Green B, Dyelene Ponceau 3RB, Dyelene Chrome Red, Dyelene Cloth Scarlet G, Dyelene Metanil Yellow, Dyelene Azo Yellow, Dyelene Fast Acid Yellow G and Dyelene Bismark Brown R; Intermediates: Dyelene M T. D. (Meta Toluylene Diamine), and Dyelene Developers.

The company has several additional colors in preparation and intends to put these on the market in the very near future.

The Wetterwald & Pfister Company, Inc., New York, has been incorporated for manufacturing dyestuffs, intermediates, etc. Incorporators are: Jacob Pfister, Roselle Park, N. J.; Rose Pfister, Roselle Park, N. J., and R. H. Funke, 622 West Forty-first Street, New York.

The dye committee of the Technical Association of the Pulp and Paper Industry has practically completed the compilation of a book on dyes in the paper industry soon to be published by the association.

An increase in surplus of \$1,159,525 for the year 1921, as compared to 1920, is shown in the annual report of the Pacific Mills.

The Pacific Color Company's plant at Chilliwack, B. C., has turned out its first consignment of mineral colors. The plant which has a capacity of three tons of dry dye color per day is the second to be established in America to utilize a German method of preparing mineral dyes and colors. The raw material used is lead ore from Field and subsidiary ingredients from the Bunson Lake district of British Columbia.

#### STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE AMERICAN DYESTUFF REPORTER.

Published biweekly at New York, N. Y., for April 1, 1922.

State of New York, County of New York, ss.: Before me, a notary public in and for the State and county aforesaid, personally appeared Alfred P. Howes, who, having been duly sworn according to law, deposes and says that he is the publisher of the American Dyestuff Reporter and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—Alfred P. Howes, 4109 Woolworth Building, New York City. Editor—Louis A. Olney, Lowell, Mass. Managing Editor—Laurance T. Clark, 4109 Woolworth Building, New York City. Business Manager—Alfred P. Howes, 4109 Woolworth Building, New York City.

2. That the owners are: Howes Publishing Co., Inc., 4109 Woolworth Building, New York City (Alfred P. Howes, 4109 Woolworth Building, New York City; Mary K. Howes, Northampton, Mass.; William F. Collins, Upper Montclair, N. J.); Louis A. Olney, Lowell, Mass.; Derfla H. Collins, Upper Montclair, N. J.; N. H. Hiller, Carbondale, Pa.; Joseph L. Schroeder, Hartsdale, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

A. P. Howes, Publisher.

Sworn to and subscribed before me this 16th day of March, 1922.

[Seal]

Edw. E. Vincent.

(My commission expires March 30, 1922.)

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

MAY 8, 1922

NUMBER 10

## GEIGY COMPANY, Inc.

89-91 Barclay Street, New York City

### *ANILINE COLORS*

Gentlemen:—

Since it is not possible for us to know your every requirement in your dyeing department, we wish you to feel that you can call upon us at any time for information.

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We have practical men whose knowledge and service are at your disposal; you have only to avail yourself of their assistance.

Are you confronted with any problems now? If so, we shall consider it a privilege to demonstrate our ability and usefulness to you.

Let us know how we can best serve you.

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

VOL. X

NEW YORK, MAY 8, 1922

NUMBER 10

## Charts for the Dyehouse

A Quick, Accurate Method for Working Out Formulas by Means of Charts Which Give Amount of Dye Corresponding to a Given Per Cent, or Per Cent Corresponding to a Given Amount of Dye, Without Calculation—Suggestions for Further Applications, and Construction of Charts

By CHARLES F. GOLDTHWAIT and JOHN E. HOFF

*Chemists, Klearflax Linen Rug Company*

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THIS is the day of charts and graphs. We use them for everything from recording the weight of the baby to following world markets, so why not adapt a few to the dyehouse? Here are some suggestions which can be used, no doubt, "as is" for many purposes, or with a few simple changes can find still wider application.

Tables for the determination of amounts of dye corresponding to percentages or various weights of stock are common but usually require some figuring to arrive at the desired result. Long-hand calculation is no doubt more common, more subject to error, and takes longer. These charts replace both in a much simpler way and not only show the amount of dye corresponding to a given per cent but are reversible and will show at once the per cent that corresponds to a given amount of dye.

Figure 1 will illustrate the method. Having given any amount of stock that is indicated on the left-hand side, and any per cent that appears on the middle scale, the amount of color in pounds and ounces can be read at once from the right-hand scale if a straight edge is laid across the two given points. It intersects the third line at the required amount. For example, we scale from 260 pounds of stock through  $3\frac{1}{2}$  per cent and get 9 pounds 1 ounce. Calculation gives 9.1 pounds, so our result is close enough for all practical purposes, considering the amount and depth of shade.

As a second example, assume that we have a dye formula given in pounds of color for a given number of pounds of stock. Scaling between these two figures will give at once the per cent of dye. From this we can use the same chart to get a new formula for any other quantity of stock within its range.

We can even conceive a third case where we have a standard formula which can be expressed in percentages, and have only a limited amount of dye. By merely scal-

ing through the known points we can find just what weight of goods can be colored with our odd lot.

The first three charts shown, cover dyeings on lots of stock up to 400 pounds with sufficient accuracy for ordinary work. There are two sets of figures on the first two:

Chart	Range: Pounds of Stock	Reads Directly	Closely Estimated to
1 .....	200-400	2 oz. dye	1/2 oz. dye
1 .....	100-200	1 oz. dye	1/4 oz. dye
2 .....	50-100	1/2 oz. dye	1/8 oz. dye
2 .....	25- 50	1/4 oz. dye	1/16 oz. dye
3 .....	0- 32	1/4 oz. dye	1/16 oz. dye

If these particular charts do not happen to answer the specific requirements, more suitable charts can easily be made by varying the size, shape and graduations. While they will require some study, they are not difficult to design when once understood. Some of the possibilities follow:

Greater accuracy for specific purposes can be obtained by decreasing the range of each single chart.

Higher percentages can be covered by developing the per cent line to any desired length.

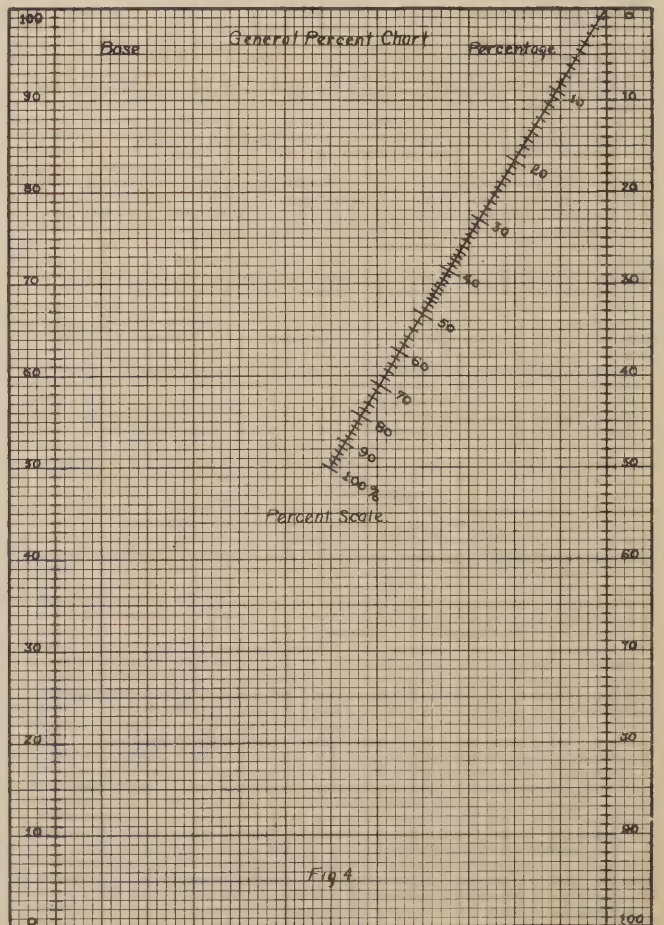
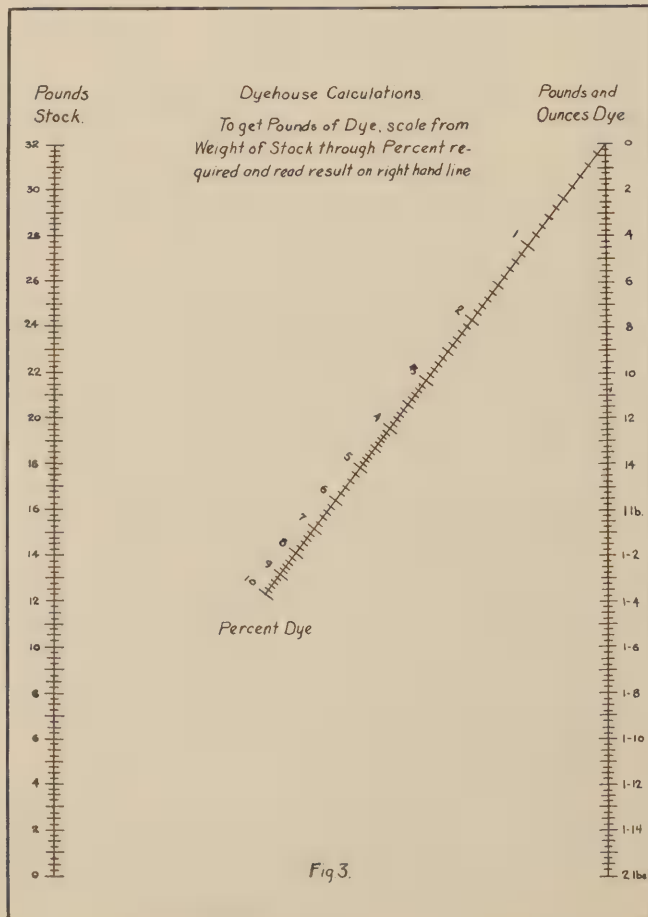
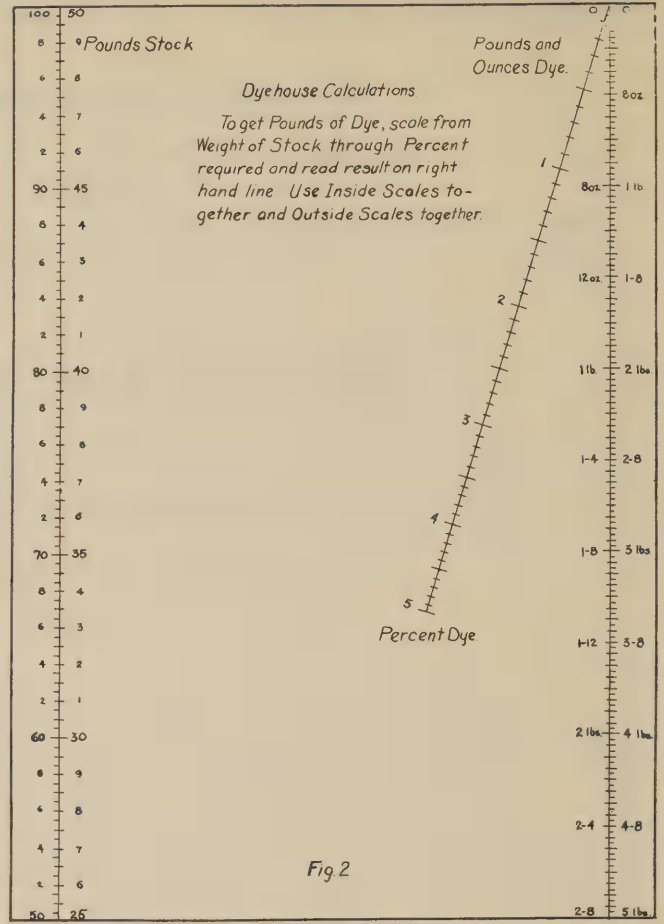
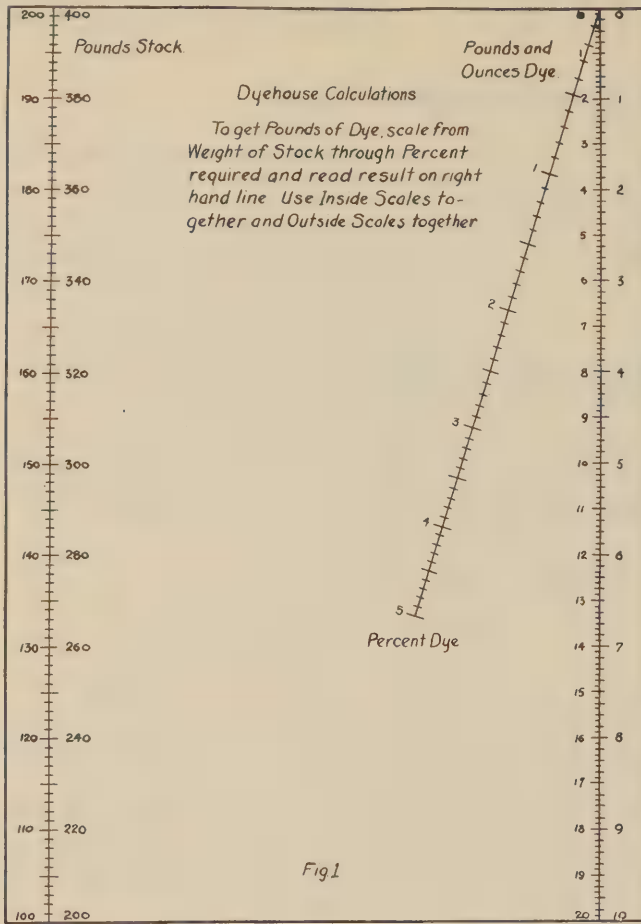
Either decimals or common fractions of per cents can be used.

Amounts of dyestuffs can be indicated as ounces and fractions of ounces, by the better system of decimals of a pound, or in metric units.

Any large amounts of stock, yarn or piece goods can be easily covered.

This same style of chart also has been used extensively by the writers for determining per cent of moisture or regain in textiles, determining weight per square yard of





piece or roll goods, and for routine laboratory calculations. Charts for such purposes can easily be made, and much time saved by the use of them in certain types of routine work. Several such applications and a more detailed explanation of the "theory" of this type of chart were given by one of the writers in "Textile World" for December 31, 1921. The working principle is the same as for dyes, and without going into too much detail it may be said that the chart depends on the geometrical principle of similar triangles. A very general type is here shown as *Figure 4*, and the method of drawing a line from any place on the right to any number on the left, such that the line crosses the third scale, indicates at once on the third scale the per cent that the first number is of the second. This fact can be verified for any number of points.

Any two parallel lines will serve as the sides of the chart; graduate them in equal divisions but in opposite directions from zero. Draw half of the line joining the two zeros. If cross-section paper is used, the fine lines serve directly as subdivisions for the side scales, and the per cent line can be drawn from the center of the sheet to the proper corner. A line drawn from 100 on the right side to 100 on the left will pass through the center of the sheet and fix the 100 per cent point. This means that the first 100 is 100 per cent of the second 100. To get the other graduations, start from 100 on the left side as a base and scale across to 5, 10, 15, 20, etc., on the right side. The intersections of these lines with the inclined line give the various per cent graduations, and the chart is made. All the others are a modification of this simple case.

A few hints may help if the attempt is made to develop a new form. Graduations are sometimes most easily obtained by tracing from a piece of cross-section

paper. Thin bond paper is usually best for drawing, as the chart can be blueprinted and the original used only when new copies are required. Two or more scales can be made on the same side lines if the numbers on both sides of the chart are multiplied by the same common factor. Thus two charts can be made by drawing only one, or the range of the single chart is greatly increased. There is liable to be confusion, however, if more than two scales are used. *Figures 1 and 2* are an illustration of this double construction.

Subdivisions of the per cent scale can be located in the same way as the main divisions; fine ones can be put in accurately free-hand, or there are simple geometrical methods that can be used. There is no necessity of making subdivisions too fine, as the amounts can be very accurately estimated. It must be noted that the actual length of unit per cent decreases rather rapidly as the per cent reading increases, so it is well to accurately determine part of the subdivisions at rather frequent intervals, and only estimate the others over short distances, usually not much more than half an inch. Otherwise, slight errors may creep in and may even be detected in the present charts if applied to the finest work. It is not well to crowd too great a range into a single scale, although if made large enough one chart could cover almost any intervals and give accurate readings.

As in every innovation, the use of such charts may seem a little awkward at first, but they are in reality very simple and will be found to be great savers of time. Although these examples are graduated in the ordinary system of pounds and ounces, the economy would be still greater if they were designed for either the metric or decimal pound systems, as they can be used for systems of weights and for any units from grains to tons.

## Cause of Nibs and Lousiness in Dyed Silks

Composition of the Silk Filament—Low Cohesion as a Cause of Lousiness—Nibs Are Produced by Worm;  
Most Other Defects Arising During Spinning Operations—Nibs Not Increased by Dis-  
eases of Worm—Dyeing Operations Do Not Cause, but May Develop,  
Nibs—Rules to Observe in Degumming

By L. C. LEWIS

*Rare Silk Inspector, Wilkes-Barre Silk Company, Paterson, N. J.*

THE silken fiber consists of fibroin and sericin; the cocoon filament as it comes from the two glands of the worm is called bavelle bria. These are agglutinated as they come from the worm, and form the silk filament.

The cocoon filaments are channeled and have sericin granules inside and in some cases the fibroin nucleus shows swellings originated by uneven lumps of silken substance. These swellings of the filaments can al-

ways be provoked by chemical and mechanical means, thereby giving origin to the defect of dots or nibs which are found in dyed silks.

In 1895 Professor Vlacovich, studying the silken filament, found that alkalies make the channeling evident, even where it is less distinct, as it occurs in the exterior layers of the cocoon.

In 1896 Professor Lenticchia, after a micrographic study of the dots or nibs in dyed silks, concluded that



the channeling is due to extremely thin fibrils of sericin contained in the fibroin. The peeling off of the fiber during the process of dyeing ought consequently to be ascribed to the dissolving of the interior fibrils of sericin. Worms born weak, or weakened by various causes during the breeding, are indicated in the fiber by the first layers of the cocoon, the shape of ribbon, and a greater facility to divide into fibrils.

#### CAUSES OF LOUSINESS

Lousiness is also caused by silks with a low cohesion; that is, silk that is poorly agglutinated in the spinning or filatures. This cohesion is affected by the quality of the cocoons and the district from which they come. Cocoons that come from the Sinshiu district nearly always have low cohesion, while cocoons from the Awa district have high cohesion. The following conditions affect the cohesion: Temperature of water, speed of reeling, cross or croisure made during spinning, cleanness of the water, and mineral salts in the water.

Silk that is reeled from fresh spring cocoons has the best cohesion, while the silk that comes from summer and autumn cocoons usually has poorer cohesion. Silk that is stored for a long time in a dry place will have a low cohesion, and therefore when boiled off will be hairy or lousy.

#### WORM RESPONSIBLE FOR NIBS ONLY

Nibs are the only defect made by the worm; all defects such as raw knots, slugs, bad throws, corkscrews, large knots and loops are made during the spinning operations.

We have found that poor raw silk will have a tendency to ravel; therefore, when we know this the dyeing operations must be governed so as to develop as little as possible these defects. The boiling off must be done very carefully and the skeins handled as little as possible. The water should not boil, and the right kind of soap should be used, always remembering that raw silk is a very delicate thread and very expensive.

The use of the soap degumming machine should be encouraged, as with this machine the silk is handled less.

From experiments made on Italian raw silk it is seen that the nibs are no more frequent in filaments near the chrysalis than at the beginning of the cocoon:

(Length of thread examined, 1,900 meters.)

	Number of Exfoliations per —— 1,000 Meters ——	
	Sample No. 1	Sample No. 2
Silk of the exterior covering of the cocoon .....	77	50
Silk of the interior covering of the cocoon .....	61	58

#### NIBS NOT INCREASED BY DISEASES OF WORM

The diseases of the silk worm, such as Botrytis Basiana (muscardine), do not seem to cause more nibs or splitting of the fiber:

(Length of thread examined, 1,900 meters.)

	Number of Exfoliations per —— 1,000 Meters ——	
	Sample No. 1	Sample No. 2
Silk of unaffected cocoons....	58	81
Silk of affected cocoons.....	39	58

Thus we find very little difference—no more, in fact, than is found in different sections of the filament.

The effect of fumes was also disappointing:

	Number of Exfoliations per 1,000 Meters	
Standard silk length of fiber examined, 6,000 .....	189	
Cocoons treated with sulphurous fumes, 7,000 .....	186	
Cocoons treated with formaline fumes, 5,000 .....	207	

Diseases such as muscardine, humidity and fumes do not seem to cause nibs or exfoliation of the fiber, but they do cause a poor yield of cocoons.

#### DYEING MANIPULATIONS AS A CAUSE OF NIBS

Nibs are not made in the dyeing operations, but are developed by improper dyeing manipulations, as in the following example, wherein 70,000 meters of silk were examined:

	Number of Nibs
Silk dyed in the laboratory.....	216
Silk dyed by manufacturers.....	986

The use of old baths should be discouraged, as one must treat longer and the tinctorial substances used in dyeing affect the number of nibs that can be easily observed. For example:

	Number of Nibs per 1,000 Meters
Thread of white silk .....	378
Thread of yellow silk .....	481
Thread of green silk .....	383
Thread of red silk .....	356
Thread of blue silk .....	264
Thread of black silk .....	115

It appears that the visibility of nibs is lessened when the silk is dyed black, and is the greatest in yellow.

## MUCH DEPENDS ON DYER

Even when the manufacturer has a clear idea of all the factors that have an influence on the luster of a fabric, and has regulated the purchase of silk in relation to them, the result is always subordinate to the work of the dyer, who, in his turn, has difficulties to overcome, because the threads are made from different worms, size, degree of twisting, winding and stretching. For these reasons, the work of the dyer often becomes very difficult.

The writer recommends during the degumming the following:

First—That the fiber be motionless in order that it be not exposed to the least strain during the period in which it is immersed in the hot soapy solution.

Second—That inequalities of heating be avoided by

having the liquor, in which is the silk, moderately circulate toward a tank in which the heating is done.

Third—That it be possible to take off at certain given moments the silk that requires less ungumming.

## CONCLUSIONS

That it is the task of the seed producer to take into consideration in his selections the structure of the fiber and to eliminate those breeds in which the silks are usually channeled or subject to exfoliation.

That silk manufacturers ascertain by tests, before the purchase of the material, whether the silk selected is adapted to the making of the goods which they are to produce.

That dyers have the task of treating the silks in such a way that nibs or exfoliation shall not appear.

## Notes on Hypochlorous Acid and Chlorine, with Comparisons of Their Bleaching Action

Decomposition of Hypochlorous Acid in Presence of Nitrate—Comparison of the Bleaching Action of Chlorine and Hypochlorous Acid—The Solution of Chlorine in Water—Action of Very Dilute Chlorine Water on Solution of Litmus

By R. L. TAYLOR, F.I.C.

*From a paper read before the Manchester Section of the Society of Dyers and Colourists, and printed in the "Journal" of the Society*

THE hypochlorous acid used in the following experiments was prepared by distilling bleaching powder, mixed with thirty times its weight of water, with twice its weight of boric acid, as described in a former paper (Taylor and Bostock, *Chem. Soc. Trans.*, 1912, p. 451). The solution of hypochlorous acid so obtained is generally about  $N/10 \times 1.5$  in oxidizing power, and contains about 4 grms. of the pure acid per liter.

The solution is quite colorless. When kept, it is fairly stable in the dark, but decomposes more or less rapidly in presence of light, in ways previously described by several observers. In bright sunlight it soon turns yellow and oxygen is slowly evolved. In ordinary diffused daylight two samples lost 63 per cent and 87 per cent of their oxidizing power in five and six months respectively. Another similar sample kept in the dark lost 28 per cent in five months, while still another, kept sealed up in a small flask in the dark, lost only 50 per cent in six years.

During the decomposition of hypochlorous acid, chloric acid and hydrochloric acid are always produced, together with some oxygen and some chlorine. The decomposition probably proceeds in the first instance as follows, corresponding to the well-known change of hypochlorites into chlorates and chlorides—



But as soon as any hydrochloric acid is produced in this

reaction it would immediately react with some of the hypochlorous acid and liberate chlorine. This is probably what takes place in direct sunlight, when there is a manifest liberation of chlorine, which is not the case in ordinary daylight with an acid of the strength described.

### DECOMPOSITION OF HYPOCHLOROUS ACID IN PRESENCE OF SILVER NITRATE

When a solution of hypochlorous acid is mixed with one of silver nitrate, only a slight milkiness is observed at first, but this soon increases and a curdy white precipitate of silver chloride begins to form, which continues to increase. The decomposition of the hypochlorous acid proceeds quite rapidly under these conditions. The change which takes place is that represented by the equation given above (into chloric and hydrochloric acids), but the immediate removal of the latter by the silver solution greatly stimulates the decomposition. The change is almost complete in a few hours, although a little hypochlorous acid usually remains at the end of twenty-four hours. The greatly increased rapidity of decomposition of hypochlorous acid by the immediate removal of the hydrochloric acid formed suggests that the action is a reversible one—

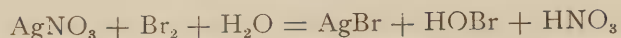


Experiments were made to ascertain if there is any in-



dication of hypochlorous acid being formed by the action of dilute hydrochloric and chloric acids on each other, but the results were all negative. It has been shown, however, by Foerster (*J. Pr. Chem.*, 1901 (ii), p. 141), and Sand (*Zeit. physicall. Chem.*, 1904, p. 465), that the action is a reversible one, so that the accelerating action of silver nitrate is quite explicable.

This rapid decomposition of hypochlorous acid in presence of silver nitrate is interesting in connection with the fact that long ago Dancer (*J. Chem. Soc.*, 15, p. 477) gave a method of preparing hypobromous acid by the action of bromine water on a solution of silver nitrate, the action being represented as follows:



Similarly, there is no doubt that hypochlorous acid is produced when chlorine water is added to a solution of silver nitrate, but this hypochlorous acid decomposes so rapidly in presence of the excess of silver nitrate that this action could not be suggested as a means of preparing the acid.

This considerable difference in the behavior of hypochlorous and hypobromous acids in presence of a solution of silver is remarkable. Unders these conditions the latter acid is much the more stable of the two. If bromine water is shaken up with a sufficient quantity of silver nitrate solution and the liquid filtered from the precipitated silver bromide, it remains clear for days and gives all the tests for hypobromous acid. But this does slowly decompose, and, if the solution is kept for a long time, silver bromide gradually separates out, forming shining crystals, which for a time float on the surface of the solution.

This difference between the two acids, hypochlorous and hypobromous, is explained by the fact that while the former is only slightly ionized when in solution, the latter is still less so.

#### COMPARISON OF THE BLEACHING ACTION OF CHLORINE AND HYPOCHLOROUS ACID

In former papers the author has frequently expressed the opinion that the general impression that hypochlorous acid is a more active bleaching agent than chlorine is a mistaken one. Further experiments have confirmed this. Many comparative experiments with solutions of chlorine and hypochlorous acid (of the same oxidizing strength), and coloring matters of various kinds, have shown practically no cases where the chlorine did not attack the coloring matter more energetically than the hypochlorous acid. Naturally, the bleaching activity of the latter is greatly stimulated by the addition of hydrochloric acid, since this immediately decomposes hypochlorous acid with liberation of chlorine. (This action is later discussed more fully, and it is shown also that hydrochloric acid

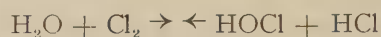
also stimulates the bleaching action of chlorine water.)<sup>1</sup> It is remarkable, however, that with moderately strong solutions of hypochlorous acid (say, N/10 to N/20), the bleaching action is stimulated by the addition of other dilute acids, such as sulphuric and nitric, and even phosphoric and acetic acids. But none of them stimulate the action so much as hydrochloric acid, and in the case of very dilute solutions of hypochlorous acid (say N/500), the other acids have little or no effect. Since a solution of hypochlorous acid in water is only very slightly ionized, the stimulating effect of sulphuric and nitric acids is doubtless due to the fact that they introduce many more hydrogen ions into the solution.

If pieces of calico dyed with Indigo or Turkey Red are placed in moderately strong solutions of chlorine and hypochlorous acid of the same oxidizing strength, the bleaching is at once seen to proceed more rapidly in the former; but later the hypochlorous acid becomes more active, and may ultimately catch up with the chlorine. The explanation is that as the hypochlorous acid bleaches by giving up oxygen, it leaves hydrochloric acid, which then decomposes some of the remaining hypochlorous acid, liberating chlorine.

#### THE SOLUTION OF CHLORINE IN WATER

More than fifty years ago Williamson held the view that chlorine water contains both hydrochloric and hypochlorous acids, and that the presence of the former was proved by the fact that the solution gave a curdy white precipitate with silver nitrate. He did not state that the action of chlorine upon water was a reversible one, though he probably had this in mind.

Doubtless this view is correct, although in an ordinary saturated solution of chlorine in water the reaction—



does not proceed far in the direction from left to right; a very large proportion of the chlorine is still in the free state, so that comparatively small amounts of hydrochloric and hypochlorous acids are present in the solution. But if the chlorine water is diluted with four or five times its volume of water,<sup>2</sup> the yellow color practically disappears, and it might be supposed that the action had proceeded to a considerable extent from left to right. The fact that the color partially returns on the addition of concentrated hydrochloric acid seems to confirm this. But in the colorless solution the odor of free chlorine

(Continued on page 347.)

<sup>1</sup> An admirable illustration of this difference in activity between chlorine water and hypochlorous acid is to add a few drops of each to separate portions of a dilute solution of Indigo-carmin, which is instantly bleached by the former but only very slowly by the latter. The stimulating effect of hydrochloric acid is very evident if a few drops of it are added to the hypochlorous acid before it is mixed with the coloring matter.

<sup>2</sup> At ordinary temperatures a saturated solution of chlorine in water is a little over N/10, so that the diluted solution would be about N/50 to N/60.

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

### *President*

LOUIS A. OLNEY  
Lowell Textile School, Lowell, Mass.

### *Vice-Presidents*

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ARTHUR E. HIRST      WILLIAM K. ROBBINS  
WALTER M. SCOTT

### SIXTH COUNCIL MEETING

The sixth meeting of the Council of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., on Saturday, April 22, 1922.

The following members were in attendance: L. A. Olney, William D. Livermore, William H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Duffee, William K. Robbins and W. E. Hadley.

The following members were admitted into the Association by vote of the Council:

#### *Active Membership*

Bartenbach, Oscar C., 333 Graham Street, Highland Park, N. J.

Colorist, Dyamine Chemical Company.

Bick, Ernest C. T., 786 Drexel Building, Philadelphia, Pa.  
Colorist, Bick Dyeing Company, Inc.

Caffray, William E., 390 Main Street, Nashua, N. H.  
Superintendent Dyeing and Finishing, Nashua Manufacturing Company.

Chamberlain, George E., 1650 East William Street, Decatur, Ill.

Plant Manager, A. E. Staley Company.

Doggett, Charles S., Clemson College, South Carolina.  
Professor Textile Chemistry.

Faunderlich, Felix, Forstmann & Huffman Company,  
Passaic, N. J.  
Textile Chemist.

Goldman, Dr. Joseph, 667 Vanderbilt Avenue, Brooklyn, N. Y.

L. Sonneborn Sons Company.

Hamlen, Jr., W. G., Room 442, Central Y. M. C. A., Philadelphia, Pa.

Demonstrator, Du Pont Company.

Harley, Alexander, 212 Oliver Street, Fall River, Mass.  
Colorist, Algonquin Printing Company.

Newman, Douglas C., 2 Buckingham Apartments, Wilmington, Del.

Colorist and Chemist, Du Pont Company.

Payne, Lorne, P. O. Box 721, Windsor Locks, Conn.

Superintendent Dyeing and Finishing, J. R. Montgomery Company.

Seiler, Raymond A., 3523 Frankford Avenue, Philadelphia, Pa.

Boss Dyer, Philadelphia Silk Works.

Stokham, Burton, 26 Fountain Place, Poughkeepsie, N. Y.

Plant Manager, Palatine Aniline & Chemical Company.

Wilson, C. C., 126 South Front Street, Philadelphia, Pa.  
Manager, Du Pont Company.

#### *Junior Membership*

Evans, E. J., 2403 West Eighteenth Street, Wilmington, Del.

Chemist, Du Pont Company.

Hartwig, Carl E., Garfield Worsted Mills, Garfield, N. J.  
Textile Chemist.

Nuttall, Fred L., 242 Earlham Terrace, Philadelphia, Pa.  
Dyer's Assistant, I. A. Harris Company.

It was voted by the Council to have the Secretary send out the list of prospective members immediately.

Respectfully submitted,

W. E. HADLEY, Secretary.

### FIFTH RESEARCH COMMITTEE MEETING

The fifth meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held in the Engineers' Club, Boston, Mass., Saturday afternoon, April 22.

The following members were in attendance: L. A. Olney, William D. Livermore, William H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Duffee, William K. Robbins, William R. Moorhouse, W. J. Murray and W. E. Hadley.



A very complete outline of "Fastness of Dyed Wool to Fulling, Scouring and Washing" was discussed by the committee, same having been prepared by William D. Livermore, chairman of the special committee appointed for this work. This paper is to be published as a provisional method, and after same has been subjected to criticism and any needed alterations made, will be considered standard for this type of work.

The report of the special sub-committee on "Fastness of Cotton Material to Scouring and Washing," George A. Moran, chairman, indicated that good progress was being made in the work of this committee.

The report of the sub-committee on "Fastness of Silk to Scouring and Washing," W. M. Scott, chairman, showed that this section of the work is coming along very nicely.

Respectfully submitted,

W. E. HADLEY, Secretary.

## Provisional Method on Fastness of Dyed Wool to Fulling, Scouring and Washing

The following provisional method on "Fastness of Dyed Wool to Fulling, Scouring and Washing" is published by William D. Livermore, Chairman of the Sub-Committee of the Research Committee which was appointed for this purpose.

In submitting this report the Research Committee wishes it definitely understood that it is provisional and is open for suggestions or discussions on the part of the members of the Association, or any others who may be especially interested.

This method will not be adopted as an official method until sufficient time has elapsed to give everyone an opportunity to make any criticisms or suggestions that may be necessary for its improvement, and with this in mind the Research Committee specially invites such comment.

In making this classification, the colors are regarded as being dyed in full shades—generally 2 per cent of full strength powder colors—by the standard methods for their class, except as particular methods or percentages of color are specified.

*Class 1A*—Colors fast to four or more hours' ordinary fulling with alkaline soap in the fulling mill without staining cotton, wool or silk, and without changing the character of their color materially or losing depth of color to a greater degree than do the dyes given as standards for this division.

Colors in this division must also stand the test for fastness to hot soap.

Standards:

- Vat Indigo (Medium Navy Blue Shade).
- S 782—Anthracene Brown on Chrome Bottom.
- S 551—Erio Chrome Azurol B (Top Chromed).
- S 157—Diamond Black PV 5% (Top Chromed).
- S 601—Alizarine Green (Chrome Bottom) Coerulein.
- S 774—Alizarine Black (Chrome Bottom).
- Fustic 10% Extract (Chrome Bottom).

*Class 1B*—Colors which are fast to two hours' or more fulling with alkaline soap in a fulling mill without staining cotton, wool or silk, and without losing character of color or depth of shade to a greater degree than the standards for this division.

Colors in this section are not perfectly fast to the hot soap test.

Standards:

- S 862—Alizarine Blue Black B (on Chrome Mordant).
- S 180—Erio Chrome Blue Black BC (Top Chromed).

*Class 2*—Colors equal to Class 1B, except that in two hours' fulling they may stain silk or cotton but not wool.

Standards:

- S 275—Diamond Black F (Top Chromed).
- S 780—Alizarine Red S Powder or Alizarine Red W Powder (Chrome Mordant).
- Alizarine Cyanine Blue GG (on Chrome).
- Picramic Acid Browns (Top Chromed).

The above classes include practically all true vat or chrome colors when dyed by the methods giving the best results with the individual colors—either developed by oxidation from a vat or dyed on a chrome bottom with or without topping off with chrome or dyed by the top chroming method or by the "chrome-in-the-bath" method.

These colors are not stripped by boiling in a 10 per cent solution of 18-deg. ammonia for five to ten minutes.

A number of colors belonging to the foregoing classes of dyestuffs when dyed by the ordinary chrome mordant method will stain wool materially in two hours' fulling, but are practically all fastened by top chroming.

Examples: Picramic Acid Browns.  
Alizarine Yellow R.  
Chrome Oranges.

*Class 3*—Self-colors which stand two hours' fulling without staining white wool materially, but which may stain cotton or silk in varying degrees.

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Colors in this class are stripped more or less by boiling with a 10 per cent solution of 18-deg. ammonia for ten minutes.

This class of colors gives normal shades without a mordant, but may or may not be improved in fastness by a chrome bottom or top chroming.

- (a) Direct Dyeing Alizarine Colors:  
S 865—Alizarine Cyanine Green G Ext.
- (b) Triphenyl Methane Colors:  
S 545—Patent Blue A.  
S 530—Formyl Violet S4B.  
and American equivalents.
- (c) Sulphon Colors:  
S 257—Sulphon Cyanine 5R Ext.  
S 188-189—Sulphon Acid Blues.
- (d) Diamines:  
S 474-475—Diamine Green.  
S 343—Diamine Fast Red F.  
S 304—Chrysophenine.

A large number of colors are practically used for moderate fulling and belong chemically to this division, but, both in the fulling mill and laboratory test, stain wool more than the standards for this type and can be rated as Class 3B.

The following are examples:

- S 856—Alizarine Astrole B.
- S 855—Alizarine Sky Blue B.
- S 355—Anthracene Red.
- S 233—Cloth Red B.

*Class 4*—Colors which stand a very light fulling and which have a moderate fastness to scouring, but which, unless conditions are favorable, will stain white wool, and probably cotton and silk, too much for practical use.

This class is represented by:

- S 161—Fast Red A.
- S 543—Patent Blue V.
- S 23—Tartrazine, etc.

*Class 5*—Sour colors which stain wool badly in two hours' fulling and generally bleed continuously with soap, the shade going down continuously.

This class includes many common sour colors, generally used only for dyeing dress goods by the ordinary sour dyeing method.

Examples: Indigotine.

- S 524—Acid Magenta.
- S 858—Alizarine Saphirole B (dyed sour).

From the point of view of the user of textiles, colors of Classes 1, 2 and 3 should all be acceptable, except that special conditions may arise where exposure to alkaline treatment will render some colors of Class 3 unsatisfactory.

Class 4 should be acceptable where no treatment of goods with soap or alkali is to be expected.

Class 5 should not be acceptable where any fastness whatever to washing with any soap or alkaline detergent is to be considered.

In making this classification the tests have been carried out as follows:

#### MILL TEST

A sample of the dyed wool or yarn is wrapped about a small sample of white wool, a bit of cotton and a bit of silk, and the whole tied into a flattened ball held in shape with silk and cotton yarn tied about it. This ball is sewed up in a strong cotton bag and attached to white goods and fulled in the ordinary course of mill work for two hours.

The ball is then cut open horizontally, rinsed carefully free from soap and dried.

#### HOT SOAP TEST

Immerse 2½ grams of the dyed yarn together with pieces of white worsted and cotton cloth 3 inches square in 125 c.c. of soap solution containing 10 grams of neutral white soap per liter. Cover with watch glasses and heat on the steam bath or water bath one hour at 200 deg. Fahr. approximately, stirring occasionally. Rinse and dry. The cotton should not be stained at all. The white wool should be no more than slightly dulled or yellowed. Comparison with a simultaneous test of one of the standards is important until the operator has acquired experience.

#### LABORATORY FULLING TEST

Take 2½ grams of the dyed yarn and braid it with smaller amounts of white wool, cotton and silk in such a way that the dyed wool makes good contact with the three undyed fibers. The weight of the dyed wool must be at least equal to the combined weight of the undyed material.

The solution for the test contains 5 grams of white neutral soap and 2 grams of soda ash per liter. Soak the braided sample in 150 c.c. of the above solution for sixteen hours at room temperature. Then heat to 140 deg. Fahr. Remove from the bath and mill briskly on a scrubbing board until the wool is thoroughly felted. Rinse, dry and unravel for examination. The test so



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made compares fairly well with a two-hour mill fulling.

#### STANDARDS USED

The standards used in these tests are given in terms as nearly as possible of the original type first described in Schultz, and in nearly all cases the Schultz number is given. It should be understood, however, that American equivalents are made for the majority of the colors selected as standards. As these American equivalents are produced by a number of competing firms, it was thought best not to give brand names that might appear to give a preference for the product of any one American firm.

#### MEETING OF RHODE ISLAND SECTION

On March 24, 1922, at 8 o'clock, a joint meeting of the American Chemical Society and the American Association of Textile Chemists and Colorists was held at the rooms of the Providence Engineering Society.

A very interesting address was given by William H. Adams, of the Eastern Finishing Company, Kenyon, R. I., an abstract of which is appended hereto, the subject being the chemical processes of water-proofing and mildew-proofing of textile fabrics. There was a large attendance and a discussion followed.

Respectfully submitted,

FREDERIC C. CUSHING, Secretary.

#### SOME CHEMICAL ASPECTS OF WATER-PROOFING AND MILDEW-PROOFING TEXTILE FABRICS

[Abstract of an address delivered by William H. Adams, Manager of the Eastern Finishing Works, at a joint meeting of the R. I. Section of the American Association of Textile Chemists and Colorists and R. I. Section of the American Chemical Society, held in Providence on March 24.]

**M**R. ADAMS gave a brief historical introduction in which he traced the development of the art of water and mildew proofing from the prehistoric times, when the cave man probably first noticed the effect of wiping his greasy hands on his skin, through the period of the application of the natural bitumens in preserving mummy cloths by the Egyptians, to the complete protection realized effectively and economically in the present day. In this connection, it is interesting to note that the raw materials used in the early attempts at water-proofing are those most used to-day.

True water-proofing is confined largely to cotton fabrics; wool is sometimes water-proofed, silk very rarely, and linen never. For the complete protection of the fabric, water-proofing must accompany and as-

sist in mildew-proofing because the living organisms which are the most active agents in the destruction of the cellulose fiber all require moisture.

The destructive organisms are divided into three classes: algae, mucors, and fungi.

1. Algae.—Algae are essentially pond plants requiring a full supply of water at all times. In time, algae will destroy the cotton fiber completely, although there is actually small danger from this source because conditions favorable to algae growths are seldom encountered by the fiber.

2. Mucors.—The mucors, a larger class, are multi-colored slimy growths which require the presence of moisture, not water, and darkness for their work of destruction. When mucors attack cellulose the damage is complete, although the ideal conditions for their growth are not common.

3. Fungi.—This is by far the largest and most destructive class; 90 per cent of the damage done to the commercial fiber is done by fungi. The fungi, or dry rots, consist of varicolored spores at the ends of minute web-like filaments which often grow inside the cotton fiber itself and completely destroy it. The danger from this source is great, because the dry spores are universally distributed, ready for their work of cellulose destruction at any place where the conditions are favorable.

The protection of the cotton fiber from any or all of the destructive agencies enumerated above has grown to be an important and highly specialized industry. The range of substances which may be used in water and mildew proofing is obviously limited to those having no injurious physical or chemical effect on the fiber itself and no dangerous poisonous effect on animal life. There is no single compound the use of which gives absolute protection against all classes of cellulose destroying organisms; each must be handled as a separate problem requiring individual treatment.

Algae are poisoned by certain metallic compounds, the most effective of which is copper in difficultly soluble form. Zinc and lead salts have some toxic effect, iron but slight, and aluminum little or none.

The mucors are not killed by the inorganic compounds which destroy algae; they require treatment with organic resins. Similarly, the fungi are unaffected by either metallic salts or organic resins, but require treatment with true disinfectants such as phenol, cresol and pyridine, all of which must be mixed with suitable retaining ingredients which fix them on the fiber and prevent volatilization and sublimation.

The term "water-proofing" is loosely used to cover all degrees of water-repellency from the soft, slightly treated, so-called "shower-proofed" fabrics to the heav-

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ily coated and stiff ducks which are permanently and absolutely water-resisting. Ranging between these extremes is a whole series of commercial fabrics varying in physical properties and degree of water-proofing according to the use for which they are intended.

For the more complete types of water-proofing the following materials are used: Natural and artificial asphalts, oils, waxes, greases and tars. Each of these materials has one or more serious drawbacks due to its physical properties. The asphalts crumble, oils dry and crack, waxes granulate and scale off, greases turn rancid and tars become sticky when the temperature is raised. By careful experiments there must be developed from the above-mentioned substances with certain modifying compounds a compromise formula which will give the required degree of water-proofing combined with the peculiar physical characteristics demanded in the fabric.

There is a large field for a moderate degree of water-proofing on soft fabrics, the so-called "shower-proofing." This is usually accomplished by the heating of certain basic, metallic acetates which on decomposition leave basic oxides having the property of increasing the surface tension of the fiber and giving a fairly efficient water-repellent action. Fabrics containing basic acetates of aluminum, zinc, lead, iron and copper all show water-repellent properties when heated, but for reasons of economy and ease of working aluminum is generally used.

Another class of work demands a high degree of water-proofing which will leave the fabric soft and porous; moreover, it must not harden at low temperatures or melt and oxidize at high temperatures. This effect is produced by a blending of the various standard methods.

**Complete or "diaphragmatic" water-proofing** depends on an impervious coating for the protection of the cellulose fiber. In this class are rubber-coated fabrics and cellulose nitrate and acetate plastics, all of which give complete protection against water but have no mildew-preventing qualities. Cellulose nitrate is plastic, workable under heat, holds filling materials well and is not as dangerous to handle as is commonly supposed. Cellulose acetate is expensive, requires expensive solvents, is not so plastic or ductile as the nitrate, but is non-explosive.

Lately there has been developed an interesting process which gives what may be called a "self-developed" water-proofing. Fabrics are saturated in an ammoniacal copper solution which partly dissolves and gelatinizes the fiber, and when the excess ammonia is driven off the remaining copper-cellulose compound has remarkable water-proofing qualities, although for absolute results the fabric must be after-treated. In

addition to the water-repellent properties produced by this treatment it offers the best mildew-proofing obtainable by a single process. The peculiar green color of the resultant fabric and the expense of the process have retarded the general use of material treated in this way, although it is by far the best material yet developed for use in the tropics.

At the conclusion of his talk Mr. Adams explained in detail the characteristic properties and uses of a series of water-proof and mildew-proof finishes produced at the plant of the Eastern Finishing Works, of Kenyon, R. I.

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#### NEW YORK SECTION MEETING

A meeting of the New York Section of the American Association of Textile Chemists and Colorists was held at the Hotel Pennsylvania, Friday evening, April 21.

The meeting was called to order at 8 o'clock by the temporary chairman, E. H. Killheffer. E. G. Quin was appointed temporary secretary, and proceeded to read the minutes of the previous meeting, which were duly accepted as read. A roll call of the Section followed, which disclosed that twenty-five members and several guests were in attendance.

At the conclusion of the roll call the chairman called for a report from the nominations committee which had been appointed at a previous meeting. W. R. Cathcart reported for this committee, dividing his report into two sections.

He said that his committee proposed that the officers of the association be a chairman, vice-chairman and secretary-treasurer and that these three officers, together with four other members to be elected, constitute an executive committee of seven. Motion was made that this section of the report be adopted, and it was unanimously carried.

Mr. Cathcart then reported that the committee's nominations for officers were as follows: Chairman, Percival J. Wood; vice-chairman, W. R. Cathcart; secretary-treasurer, E. G. Quin.

There being no other nominations presented from the floor, the secretary was instructed to cast a unanimous ballot for the officers named.

Mr. Cathcart then proceeded to report for the committee that in their opinion the additional four members of the executive committee should best be balloted for. He said that the committee wished to place in nomination ten members, of which four should be elected. The ten members placed in nomination were: Frank J. Oesterle, Walter M. Scott, John H. Culver, Oscar R. Flynn, Frank C. Holden, Daniel P. Knowland, K. M. McKenzie, E. F. L. Lotte, E. H. Killheffer and Joseph F. X. Harold.

Tellers were thereupon appointed and the meeting



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proceed to ballot for selection from the above-named nominees, each member voting for four candidates with the understanding that the four receiving the highest number of votes should be elected. After the ballots had been counted the secretary reported that Messrs. Flynn, Killheffer, Oesterle and Scott had been elected. At the conclusion of the balloting the newly elected chairman, Mr. Wood, took charge of the meeting.

Addressing the chair, Mr. Killheffer introduced the question of the location and frequency of future meetings. He reviewed the question discussed at the previous meeting of the desire on the part of many members of the section that at least some of the meetings be held in Passaic or Paterson. He also expressed the opinion that a better spirit of fellowship could be developed if meetings were preceded by an informal dinner. A general discussion of this topic took place, at the close of which it was moved and carried that there be nine meetings during the year, to be held approximately one each month with the exception of the summer season, and that these meetings be held on the fourth Friday evening of each month. The question of location of the next meeting was left to the executive committee.

The question of financing the local Section was next discussed, and it was agreed that the executive committee should report a recommendation covering this matter at the next meeting.

The chairman then introduced Dr. E. W. Norris, of Manchester, England, a visiting member of the British Society of Dyers & Colourists, with the remark that he hoped Dr. Norris would advise the newly formed Section of measures which had been found helpful in promoting interest by the British society and that he would not hesitate to criticise anything which he might have thought faulty in the organization of the New York Section.

Dr. Norris said that he felt the American Association as a whole, and the New York Section in particular, had a wonderful future before it, and that he was convinced that an organization of this sort could be of inestimable service to the American textile industry and those who served it. He suggested that a larger executive committee than the seven elected might be desirable; also that the Section make an effort to interest the schools and colleges, both students and instructors, and not confine itself too closely to the commercial side of the industry. He also favored the admittance of members not strictly engaged in textile chemical lines but whose affiliations or interests led them to take an interest in these matters. He said that many of the hardest working members of the British society were men who were not strictly chemists, in any sense of the word. He commented on the fact, brought out in a previous discussion, that the Chemists' Club, of New York, had found it necessary to charge \$35 for the use of Rumford Hall for an evening, and said

that in England a nominal fee of \$3 was charged by several of the Bradford societies owning their own buildings for the use of auditoriums or meeting halls.

He emphasized particularly the desirability of interesting students, saying that it was often possible for the older members to learn much from the younger generation, and that the future of this generation could be materially brightened by helpful association with the more experienced members. He also expressed the belief that concentration on the technical features of the Association and the exclusion of the social side was a grave mistake; that the meetings should be made entertaining and pleasant as a first consideration, and that technical matters should be of secondary importance. He did not mean by this to minimize in any way the importance of technical work, but felt that larger attendance and general interest could be secured by accentuating the social side of the Association. He said that the experiences of the English society was that special efforts should be made to make the initial meeting of the fall season a particularly interesting one. He said he felt efforts should be made to secure one or two speakers of national prominence whose presence would be sure to draw a large attendance; that by this means interest would be stimulated at the start of the season which could then be more easily maintained through subsequent meetings. He suggested that papers read cover as wide a variety of subjects as possible; that in his experience nearly every member was able to talk on some subject which, although it might not be of primary importance to the entire membership, would at least be interesting and serve to increase the general fund of knowledge. In closing, he emphasized the necessity of keeping business out of the Association and the strict avoidance of the formation of internal cliques or anything that smacked of politics.

The chairman thanked Dr. Norris for his remarks and addressed the meeting at some length, saying that he appreciated the honor that had been shown him, that he felt great confidence in the executive committee which had been elected and was sure that if all members cooperated a very successful Section could be maintained in the New York district. He emphasized the necessity of every member taking an active part in the affairs of the Association, and urged each one to give thought to the possibility of presenting papers on subjects which would be of general interest. He said that many subjects which were not strictly chemical but were nevertheless in a general way allied to chemistry could be discussed with great benefit to all members.

A general discussion of various subjects previously introduced followed the chairman's remarks, during the course of which a test vote was taken as to the location of the next meeting. The vote showed a considerable majority in favor of Passaic. The meeting then adjourned subject to the call of the executive committee.

## MEETING OF NORTHERN NEW ENGLAND SECTION

*April 22, 1922, at Engineers' Club, Boston, Mass.*

A profitable and interesting meeting of the Northern New England Section was held at the Engineers' Club, Boston, Mass., on Saturday evening, April 22. About sixty-two active members, with their invited guests, were present.

A very social half-hour was enjoyed by many before the dinner, at which old acquaintances met. The younger members had a rare opportunity to meet personally and to converse with the more experienced chemists and dyers—an opportunity which was well accepted on both sides. The social side of these meetings will undoubtedly be a big asset to the Section and to the Society.

After the dinner hour Mr. Christison, Chairman of the Section, spoke briefly on the purpose of the meeting and introduced as the first speaker Louis F. Bume, dyer at the Ayer Mills, Lawrence, Mass. Mr. Bume presented the following interesting paper: "The Causes for Shady and for Cloudy Goods."

### The Causes for Shady and for Cloudy Goods

By LOUIS F. BUME

The causes of shady or cloudy goods are very numerous. First consider the mechanical part. The speed of the drums carrying the cloth through the dye bath will vary with the different kinds of goods. At an average, 80 yards of cloth should go around once in one minute. Cloth which felts easily should go slower. The steam piping should be so that the heat is the same all over and so that no direct steam can possibly strike the goods. The feeding of the chemicals or dyestuffs must be done slowly and evenly. The chemicals or dyes should be very much diluted and thoroughly dissolved and strained through a very fine strainer into the dye bath. If the quantity of dyestuff used is only a small one, this small quantity should be added with as much water as though the quantity were large, so as to distribute it slowly through the dye bath.

The raising of the temperature should be gradual and the time used to bring the water to a boil must naturally vary according to the cloth and the dyes used. A heavy, closely woven cloth must be heated more slowly than a thin, light-weight cloth. Sour dyes require less time than chrome colors. In raising the temperature one must consider the pressure of the steam and the temperature of the water when starting. If it is found best to have the dye bath at 125 deg. Fahr. in half an hour, less steam should be used in summer than in winter. The steam pressure should be the same all the time, to enable the kettleman to know how much to use. There are instru-

ments on the market which will regulate the heat automatically and as desired.

The water plays an important part. Hard water should be softened, unclean water filtered. The water coming from swampy sources will at different times of the year cause trouble when vegetable matters cause fermentation. I know of mills in certain localities that will close their dyehouse at such times for a few weeks, as experience has taught them that they will have cloudy goods.

The mordants and acids and the quantity of these used have a great deal to do with producing even results. Some dyes require more, some less, acid to get the best results. There are dyes on the market which will precipitate in the dye bath in the presence of a small excess of a weak acid, like acetic acid, and cause cloudy goods which will crock in some places more than in others.

I will tell of some experiences. In a mill where they were having cloudy goods I found that the dyestuffs and the treatment were all right. They speck-dyed the goods with sumac and nitrate of iron. The sumac bath was retained and strengthened after every dyeing. I noticed a sour odor to the sumac bath. I started a new sumac bath and the trouble ended.

Another time the goods were very cloudy. I noticed a slight yellow stain on the goods. Upon investigation I found the cause to come from the filter beds and water tank. The filter beds were located near the coal bins. There had been a fire in the coal, which was put out by water. This water found its way to the filters and the tank from which the water was drawn for dyeing. Using the unfiltered water until everything was cleaned ended the trouble.

In another instance I found that the yarn department had substituted the olive oil they used by a lard oil which had become rancid in the course of time. Washing the cloth in the usual way did not remove the oil, so I had to boil the cloth with a solution of alkali, and then scour before dyeing.

A good deal of trouble is caused by the goods lying wet before and after dyeing, especially in a warm room. The parts of the cloth exposed to the air will dry partly or entirely and absorb the dyestuffs differently. If they partly dry after dyeing before scouring, the dry parts will not lose as much color as the wet parts, causing uneven goods. I have seen trouble caused by scoured goods being stored before dyeing for a few months near the windows, where the light would strike the exposed parts. These exposed parts dyed lighter shades than the rest of the cloth.

Carbonizing is very often the cause of a good deal of trouble. When carbonizing with sulphuric acid all sunlight should be excluded during the process. Uneven extracting of the goods then drying will give trouble.



When using chloride of alumina the precipitated alumina will deposit on different parts of the goods, and when not removed thoroughly will explain clouds. The neutralizing must be done with a great deal of care to remove the acid or the chloride of alumina thoroughly. It is best to carbonize after dyeing either with sulphuric for sour dyes or with chloride of alumina for chrome dyes, then neutralizing properly.

The cloth must be very clean before carbonizing. I know a mill which was carbonizing the goods of the loom, then washing. The result was badly clouded goods. Too much washing before dyeing is also injurious. Sometimes the dyer will complain that the goods he receives are not clean. To obviate this, the finisher will give the goods one or two extra scourings. This is as bad as dirty goods.

Shadiness—that is, the cloth being darker or lighter the whole length of the piece—cannot be done in the dye-house, but may be helped. A tight selvedge will usually cause the color to be lighter near the selvedge, while a loose selvedge will cause the shade to be darker. Sometimes this can be helped by sewing the lists together, making a bag with openings every ten or twelve inches to let the air escape. This will also prevent wrinkles at the same time.

The sizing of the warps, the fermentation of the size when left to stand overnight or holidays, will be hard to remove at times and will cause trouble.

The introduction of the second speaker, Thomas J. Biery, dyer at the Pacific Mills, Lawrence, Mass., by the Chairman came as one of the pleasant surprise features of the evening's program. Mr. Biery's name had not been mentioned previously because the unintentional delay in inviting him to speak brought back his acceptance too late for the Secretary's notice. Mr. Biery's paper, which follows, received enthusiastic applause. Mr. Biery spoke on "Shaded Goods."

### Shaded Goods

By THOMAS J. BIERY

Shaded goods are the bane of the dyer. This is something that must be guarded against. Cloth to be of marketable value must be uniform in color and design as well as in finish. It stands to reason that a piece improperly shaded loses much of its value. Therefore it is of the greatest moment to produce a fabric that will stand the severest test from every angle.

Many defects are caused in the finished fabric by scouring and steaming. Among these defects the most common are what are known to the trade as "shaded pieces." Oftentimes the result in shades is very an-

noying. Now the question is how do these shades come and how can they be avoided?

When a piece is unevenly shaded, that is, when it does not shade truly from center to side, and from end to end, the cause may be found in the steaming, or it may be caused by improper scouring, as when the pieces are scoured too hot, or when there is too much alkali in the soap used, and this is not properly washed out.

If the uneven shade comes from the steaming, this is because the piece receives a more severe steaming in one part than in another. The portion receiving more steaming than another will be darker in shade. Uneven steaming may be caused by imperfect perforations in the steam shell. The steam should come through the shell through countersunk perforated holes, about one inch apart in both length and width of pipe, and should enter evenly from both ends of shell to center, and should steam from ten to fifteen minutes, at about ten pounds pressure. Another thing to look to is the covering of the shell, for this as well as the leader, of which I will speak presently, is of prime importance.

The shell should have a thick covering so that when the steam comes into contact with the cloth there will be an even distribution or cloud of steam. This covering also prevents too much pressure. A very necessary thing is the leader. This is a wrapping wound around the outside of the cloth so that the cooling process will be uniform, that is, not too rapid nor more rapid in one part than in another. This gradual cooling, made evenly all over the piece, will produce splendid results. An evenness of shade, then, calls for an evenness of steam going through the cloth, for evenness of temperature in cooling, and for evenness of perforations in the steam shell. All this means that the results looked for will be obtained.

Now this steaming may be done in vertical or horizontal shells. In the vertical, it seems to me, that there is more chance for the cloth to show shadiness than in the horizontal. The reason for this is that there is likely to be more condensation in parts, consequent upon the unequal distribution of the steam, and the result will be irregular shading. In the grade of worsted dress goods that we are doing we prefer the horizontal shell.

All uneven shades, however, do not come only from steaming and scouring. They may come from dyeing. Among the causes for this I may mention a fluctuating steam pressure, for if the pressure is not even, the shading will not be even. Bringing pieces to a boil too quickly, or exhausting the dye bath too rapidly, especially when using a color like the Sulphon Acid Blue type will cause uneven shades. Also shading up

with concentrated dyestuff, or feeding red on light shades and cooling dye baths too quickly. Another cause is the rolling of pieces in kettles, this comes from tight selvages, and may be overcome in the manufacturing, or by tacking the selvages before they enter the dye baths.

These few remarks will answer, I hope, some of the difficulties in regard to "shaded pieces." We may not always reach perfection, but at least we strive for it. All our efforts are directed at giving satisfaction, not alone to our employers, but also to the general public, whom it is our aim and will to please.

Walter F. Haskell, dyer at Dana Warp Dyeing Company, Westbrook, Me., spoke in an interesting way about "Some Experiences with Uneven Cotton Warp Dyeing." His paper follows:

### Some Experiences with Uneven Warp Dyeing

By WALTER F. HASKELL

I cannot say very much directly about shady goods for I have been engaged for a number of years in dyeing cotton warps to be sold and woven outside of our own mill, and it is not very often that I see the finished goods of which our warps form a part. I have, however, frequently met with certain defects and faults in warp dyeing which one would expect surely to cause shadiness or streakiness in the finished cloth.

There are a great many causes of bad work of this sort. They may be divided roughly into failures of machinery and errors in the use of the necessary chemicals and dyestuffs. There is also the human element which dyers have to consider.

Not long ago at our mill the section beams made from a certain two-ply yarn began to show a few ends here and there, much darker than the proper shade. These dark streaks appeared on one or two ends only at the same time, and were only a few yards long but there were enough of them and they were sufficiently distinct to make the whole set of beams unfit to be used, and the whole 2,000 pounds of yarn had to go into black. This was a problem, for both colors had been inspected before they were twisted together and passed as entirely satisfactory. Investigation, however, revealed that while one of these colors was being dyed the driving belt had come off and the machine had stopped with, of course, a short length of the double warp immersed in the somewhat concentrated liquor. The operator of the machine had put the belt on as quickly as he could and gone ahead without saying anything about his trouble. The dark places caused by this stop were so short that they were pretty well covered up as the warps were folded off the dry cans and were not detected by the ordinary brief examination given the warp at the dryers. Even

these dark places would not have caused much trouble, being less than 1 per cent of the whole amount of the yarn, if they could have been kept together, but this yarn had to be twisted with the other color, spooled and warped again on section beams, which mixed everything up very thoroughly.

This was the simple explanation of a rather serious failure and I give it as an illustration of mechanical trouble with the human element also involved.

A frequent error in dyeing light tints with sulphur colors has come with the use of insufficient amounts of sodium, sulphide and soda ash. I have in mind a certain tan tint which has been dyed at our mill for several years. It requires a mixture of three sulphur colors, one of which is black. When we first began to dye this tint we had uneven results rather too frequently. Often parts of the warp would have a gray look quite different from the yellowish tan which was the true tone. In my endeavors to correct this trouble I went over my formula and dyeing process very carefully. Everything looked to be satisfactory; there seemed to be plenty of sulphide and soda ash in the formula but I thought that perhaps the gallon or two of stock liquor which was put into the 400-gallon tank of the dyeing machine to start the dyeing did not carry enough sulphide with it to keep the color in solution and the dyes, especially the black, were thereby given a strong tendency to become precipitated on the yarn, and that this might be the cause of the grayish streaks. On the strength of this reasoning I decided to put a few pounds of sulphide and the same amount of soda ash into the bath before adding any dyestuff, and I was much gratified to see an immediate and decided improvement in the evenness of this color.

This, I think, is a good illustration of a chemical error.

I have been speaking thus far of chain dyeing. I will now refer briefly to beam dyeing.

I have heard it said that there would never be any streaks in beam-dyed warps, but unfortunately this statement is not true. We have dyed for several years a certain gray of medium depth using a sulphur blue, a dark brown and a little bordeaux. Good results have been very uniformly obtained in chain dyeing this color and we expected equally good work in beam dyeing. When we tried it, however, we found that the combination of dyestuffs used could not be brought to a very clear solution. It was difficult to filter the bath properly and the flow of the bath through the beams seemed to be somewhat impeded. However, the color came up to shade satisfactorily, the outside and the inside samples checked up well and the beams appeared to be in first class condition. When they were put into the slasher the first two or three beams dressed were very good, but after about one-third of



the set had been run streakiness and cloudiness began to appear which grew steadily worse as more was run off the beams. Apparently the dye of poor solubility had caused incipient channeling starting from the barrels of the beams, for by substituting a more soluble brown I have been able to produce the same shade with scarcely a trace of streakiness.

I have related a few of my own every day experiences. These may seem rather commonplace in the telling but they were rather too seriously interesting to me when they happened, as you gentlemen can readily understand, especially you who are in the mills.

#### SUMMARY

Uneven dyeing of cotton warps may be caused by some mechanical failure or error of judgment in the use of dyestuffs and chemicals, or by simple carelessness.

Dark places caused by interruption of the progress of the warp through the dye bath are apt to become scattered through a large lot of yarn in the processes subsequent to dyeing and cause considerable trouble.

It is important to have sufficient sulphide of sodium and soda ash in the dye bath at the beginning of the dyeing operation in dyeing with sulphur colors, especially with light tints. This is necessary in order to hold the first small additions of dye in solution, and to prevent any tendency for it to be precipitated on the yarn.

Dyes of poor solubility are very apt to cause streaky dyeing in beam dyeing machines.

Following Mr. Haskell, a paper prepared by Frank E. Johnson, dyer at Wood Mills, Lawrence, Mass., was read by P. F. Ripley, chemist at the Wood Mills. Mr. Johnson was unfortunately detained at home because of sickness in his family, and sent his regrets for his enforced absence to the Section, through Mr. Ripley. Mr. Ripley read the paper in a very effective manner. Appreciation of the courtesy of the reader and of the contents of the paper was expressed in loud applause. Mr. Johnson wrote on "Some Causes of Shadedness and of Cloudedness" His paper follows:

#### Some Causes of Shadedness and Cloudedness

By FRANK E. JOHNSON

I have been asked to read a paper relative to my experience with cloudy and shady goods. The causes for cloudy and shady goods are many. To be reasonably free from either requires the constant attention on the part of both the finisher and the dyer in following up each operation. There are *causes* for these troubles, and it is the duty of the dyer and the finisher to work together to find the source of the trouble and make the corrections.

Most of the trouble is caused by the goods not receiving the proper treatment in the finishing and dyeing departments. If a piece is not finished evenly before dyeing it will not dye evenly, but will take up the dye according to the condition of the piece. For example, a piece shaded end to end but even in color from side to center; a piece shaded from side to center consistently from one end of the piece to the other. Also, carbonizing with sulphuric acid before dyeing is a very troublesome process, causing all shapes of stains which resist the dye. These are faults caused before dyeing. A dyer has no control over these conditions.

Cloudy and shady goods are caused by these reasons:

1. Poorly prepared; not thoroughly clean from the wet finishing.
2. Steamed goods: Uneven steam pressure; steam not allowed to pass through goods evenly, due to carelessness.
3. On the crabbing machines, uneven roller pressure.
4. Varying temperature of water.
5. Goods rolled up wet to set filled with dirty water.
6. In the dye kettle, goods taking up dye too fast caused by admission of steam too rapidly. Another is in using too much acid. These are two important factors to watch and are governed by the dyes being used and the material being colored.

#### FAULTS FROM SPECK DYEING

Most of you know the object of speck dyeing. In worsted or woolen mills there is more or less vegetable matter in the stock. After the goods have been dyed it is necessary to either speck dye or to carbonize to eliminate these specks. Some mills use sumac extract and nitrate of iron, and experience more or less trouble on account of the sumac. It is very important that the sumac should be a thoroughly filtered solution and should be applied evenly on the goods. Any sediment or uneven application of sumac before coming into the nitrate of iron bath means cloudy goods.

#### DRIERS

It might seem strange to say shady goods can be made in a drier, but I do not hesitate to make the statement.

Many pieces of goods have been called "shady" when the real cause was uneven shearing from the shears and uneven pressure on the press in the dry finishing.

Cloudy and shady goods are not altogether a dyehouse problem, but are usually charged to the dyehouse.

To keep the situation well in hand requires daily attention and the closest co-operation in all departments.

Leverett N. Putnam, dyer at the Arlington Mills, Lawrence, Mass., followed Mr. Ripley and gave a very interesting account of some of his "Experiences with Shady Piece Goods."

Mr. Putnam also entered heartily into the discussions following the last speaker.

### Experiences with Shady Piece Goods

By LEVERETT N. PUTNAM

Shady goods among piece dyes is a troublesome condition which all dyers and finishers would like to forget and never recall that such a condition ever existed or could exist. Nevertheless it is a condition which does exist at times and has to be dealt with according to the source of the trouble.

The source of this trouble is rather hard to locate. All things must be taken into consideration. Conditions up to and through the dye house, even through the sponging house, must be borne in mind. In this paper I am going to consider those conditions applying only to the dried piece of cloth after dyeing, as that will include the most important places where this trouble could be caused.

Let us take as our typical example that of dyeing worsted pieces. All conditions which would interfere with any other branch of dyeing would also interfere here.

The processes to which this line would be subjected to more or less would be the following:

1. Crabbing (Butterworth).
2. Steaming.
3. Fulling
4. Washing.
5. Dyeing.
6. Drying.

Now let us consider each process and the results which could occur in the form of shadedness later if this particular process were not carried on in a manner to obtain proper results.

#### 1—BUTTERWORTH CRABBING

Crabbing, or setting a piece of cloth to prevent it from shrinking unevenly or from becoming cockly, is resorted to on the lighter fabrics, such as dress goods, linings, and the like, particularly on the coarser lines of dress goods and men's wear. In consequence of this operation, if not properly done, there will result pieces which will be shaded from side to center or end to end. As a general rule the shadedness from side to center will be dark sides and light centers. The cause I can only guess at, but I attribute it to tension and unevenness in heat and water absorption as it runs out of the hot liquor for winding onto the roll.

#### 2—STEAMING

As a rule the opposite effect is produced with improper steaming. The tendency here is for centrally

dark pieces. The cause here is also one of tension and heat distribution. I might say that a piece improperly crabbed will be remedied or at least receive the effects of steaming (whether good or bad) because the steaming is so much more violent and at a higher temperature.

#### 3—FULLING, AND 4—WASHING

Except that a piece of cloth is made to roll at the selvages I cannot see where there should be much trouble from these sources, as regards shadiness. Trouble here, barring a piece whose selvages roll, would be confined more to a cloudy, muddy or blotchy condition.

#### 5—DYEING

The next step to be considered is the dyeing. It is the general opinion that a strictly shaded piece cannot be made here unless there is a condition further back in the process which is responsible. Perhaps this assumption is correct. I want, however, to bring out a possibility which I think is a reasonable probability.

A great many times shadedness will be found on pieces which have had no preliminary treatment except scouring. The shadedness must be caused somewhere. The only possibilities up to this point will be the spinning oils used, the tension and size preparations in the dressing, the weaving and scouring. There are possibilities for shadedness in all of these places but where proper oils and sizes are used the possibilities are not great. Tension in a dressing and weaving are greater probable causes. All these possibilities are eliminated where pieces of any particular style are dyed and certain sets come out all right while others do not. In such a case the only places left are in the dyehouse and drying. A distinction can be made here by extracting and air drying to thorough dryness the pieces in question, in which manner the drier conditions will be eliminated.

It is my opinion that shadedness, so-called, can be caused in a dye kettle where no preliminary treatment has been wrong. Let us consider the pieces as they run into a kettle. They are in the rope form and as a rule it will be found that the selvages are on the outside of the rope a large proportion of the time. I can give no explanation of this fact, but from observation I am certain that it is so. Let us assume that this is the fact. Why could not a piece be shaded due alone to penetration if certain parts are exposed more than others to the dye liquor? A difference in shade is often apparent at the sewings when one compares the outside to the inside of the seam, due to improper penetration. Again in the case of a tacked or bagged piece, if the dyeing has not been carried on slowly



enough a difference in shade from back to face will be apparent.

You probably are thinking, why should not the piece then be cloudy rather than shaded? If the exhaustion has been much too rapid it will be. Allowing a reasonable time for the color absorption there will be sufficient time for the folds to change about so that this cloudiness is not noticeable but still the selvages, as I said, I am assuming, are always to a greater extent on the outside of the rope, and consequently exposed more to the action of the dye liquor. The consequences are that, if my assumptions are correct, the selvages will be darker than the center.

To try to bring out this fact I have in mind trying to dye a certain type of goods, prepared by scouring only, by two different combinations of dyestuff. By one method I found that I could obtain very good results, but the other method gave me shaded pieces. I could not blame shadedness in this case to preparation. On air drying directly from the kettle I obtained the same results. By working on the combination which was giving me trouble I at last obtained a method of application, using the same dyestuffs, which allowed me to dye this same style with success.

I want to say a word about this particular shadedness. Although it was not apparent at times, certain pieces besides being characteristically light center would also show cloudiness to a more or less extent. At other times the striking fault would be shadedness. Always there would be that characteristic light center. I imagine, if the eye were sharp enough cloudiness could have been found in every case. However, shadedness was very apparent. By working on the fault from a point of penetration, using the inside of the sewings at the seam as a guide, I obtained less shadedness according to the success in this respect.

#### 6—DRIERS

The next and last step which I will consider is the drying. A piece of cloth may be shaded here very easily, depending on the dyestuffs which are on the piece and the amount of heat applied. Some dyestuffs are particularly sensitive to heat—Gallocyanine being one such color which after being changed by heat does not return to its original shade. Great care must be taken to have proper circulation and not too much heat. Drier trouble can always be traced by air drying the pieces directly after extracting. Care must be taken here to see that they are perfectly and evenly dried. It is best to leave them a sufficiently long time to be sure that they are dried all they will because a piece always dries from the selvages to center and a

little variation of moisture will show a lighter and bloomier center.

Frederick Spencer, dyer at the Arlington Mills, Lawrence, Mass., was the last speaker. His remarks were related to top dyeing and he gave some valuable suggestions drawn from his experiences.

#### Causes of Unevenness in Top Dyeing

By FREDERICK SPENCER

It is my opinion that a lot of unevenness in dyeing could be overcome in the laboratory, when the chemist is making up the formula, if he would select out the dyestuffs that would work the same way in combination and if he could not find dyestuffs of this description that would please the trade, to inform the dyer how the different dyestuffs acted with acid, and then the dyer could work goods to get even dyeings.

Of course, in slub dyeing a little unevenness in dyeing sometimes doesn't hurt anything, as it will gill up even, but it is most sure to throw the shade off so it will not match the standard.

It was only a short time ago that I ran into some trouble with uneven dyeing and couldn't seem to find out what was causing it. I would start four kettles with the same statement and work them the same way, yet there would be one or two sets come out uneven and sometimes the whole four would be uneven. These sets were dyed in the Marteens system of dyeing, which is similar to all top dyeing machines, except that the stock is wound on spools and these spools set in sockets inside the kettle. Now, that is just where my trouble was. With putting the spools in the sockets so many times they had spread, which caused a leak; so that some of the liquor, instead of going through the stock, would go out at the bottom of the spool and out at the top of the kettle.

Now, to overcome this I had some rubber washers made to fit the sockets and had the spools milled out at the bottom so that there was a small taper that drew down on a plug and made a tight joint on the rubber washer. This overcame all my troubles with uneven dyeing, as I haven't had an uneven set since, and at the same time made it so that I could increase my production one-fifth by putting stock on a spool.

I have found by experience that it is absolutely essential to stop all leaks, to keep the system free from air so that there would be no air spots on the dyed goods; also to see that there are no channels in the stock where the liquor would go through and cause poor circulation through the rest of the stock, which would cause poor dyeings. You should make sure that you have good circulation at all times.

When all six of the speakers were finished the meeting

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was thrown open for general questioning and discussion.

John Bannan started the discussion with an experience in connection with a Franklin process yarn-dyeing machine due to improper circulation.

Winthrop C. Durfee mentioned a case where he was called in to straighten out a difficulty related to uneven dyeing. Everything in this case appeared to be correct except the fact that the goods had been brought to a boil in ten minutes and rushed through. Mr. Durfee suggested as a remedy a much longer time in the dyeing process.

He mentioned the fact that in dyeing wool there are two sets of chemicals being dealt with, both of which become much more active chemically at elevated temperature. One set is the wool fiber and the second consists of the dyestuffs and acids in the dye bath. He said that in his belief good solubility of the dye and plenty of time in dyeing are wise conditions to provide where possible in eliminating shaded goods.

Mr. Robbins spoke of experiences with certain sulphur colors which were dyed and the goods exposed in the wet condition before washing. The exposed parts on the outside of the pile oxidized more than the unexposed parts on the inside, and when the pieces were washed the unoxidized dye was partly removed, giving uneven dyeing.

Mr. Robbins also mentioned cases in which eleven out of twelve leads in same dye liquor would be perfect and one-half of twelve would be shady. He found this hard to explain. As another thing somewhat "hard to explain," he recalled instances of goods which had been set back from the perch on account of shadedness and which after no further treatment than standing upon the trucks in the dyehouse were returned and passed as satisfactory.

Mr. Putnam suggested a possibility for the explanation of Mr. Robbins' trouble with one-half a piece out of twelve showing cloudedness. He had had cases where unevenness compared piece to piece in same dye liquor had been traced back to uneven steam heating. In remedying this condition he had changed steam piping, reel position or false partitions. If the steam tends to go to the sides of the kettles, then the center pieces will be injured in shade. He believes some forms of unevenness often blamed to scouring are really due to uneven heating.

Mr. Moffatt asked if anyone using automatic devices for controlling steam entry to dye kettle had had incorrect control through the bulbs of the thermometers becoming covered with lint.

Mr. Putnam in reply said that he had used the Tagliahue automatic controller and had found that after it had been carefully adjusted it was highly satisfactory.

Mr. Moffatt then asked concerning the closeness of control of the temperature.

Mr. Putnam stated that the indicators had a nominal range (not the minimum) from 100 to 212 deg. Fahr. and were accurate within 1 deg. Fahr., regardless of the

steam pressure (which might vary from 7 to 11 pounds).

Mr. Moffatt asked if trouble were caused by fibers on the bulbs.

Mr. Putnam said he had tried the device in the front and in the back of the kettles. He got best results in the front and there was no fiber contamination 1½ feet from bottom even after three to four months. The device gave good satisfaction.

Prof. Olney asked Mr. Putnam if he could use the controller to bring the kettles to a boil in a given time.

Mr. Putnam stated that he could, for the time-temperature control was incorporated into the device. In raising the temperature the steam entry is intermittent for each 2 to 4 deg. of rise, but at the boil it is practically continuous. The control may be set to bring to a boil with any rapidity, from forty-five minutes to two hours, and when once set is capable of being used continuously from day to day. He finds that it is serviceable in speck dyeing, where the device by clock control is used to bring the bath to a desired temperature in a given time and then holds this temperature during the run. In dyeing a Diazine Black he uses a temperature of about 130 to 135 deg. Fahr. By setting the stopclock for this temperature the steam is automatically shut off when the temperature is reached. After the time has passed the goods are washed. A continuous record shows any variation during the process and helps to reduce the human element.

Mr. Claflin mentioned the conditions prevailing in some dyehouses where steam is taken directly from high-pressure lines by means of a reducing valve. In his opinion the chemicals used often cause shadedness through unequal absorption of acid. Sulphuric acid, though used in small amounts, is more liable to localize than many dyes. At times where hard water has been used and the goods improperly scoured, shadedness may be due to magnesium soaps, which are not easily removed. In such cases of imperfect scouring magnesium has been detected upon the fabric by chemical analysis.

The Chairman asked if he had heard of trouble coming from the use of epsom salts in the dye bath as used to be done.

Mr. Claflin replied that in the absence of fatty acid upon the material no harm would result.

R. E. Fuller stated an experience of his in dyeing five-yard pieces with sulphuric acid, Glauber's salt and dye. Unless he took the precaution to add the Glauber's salt, then the acid and then to saturate the goods cold before adding dye, he usually obtained uneven results. He wondered if the Glauber's salt and sulphuric acid had any bearing on uneven results.

Winthrop C. Durfee answered from his experience that if the wool is filled with acid, then the affinity for the dyestuff (a second acid) is lessened and even results with the latter are more liable to be obtained. He finds



wool to have a greedy affinity for  $3\frac{1}{2}$  per cent sulphuric acid. In trials with chrome alum alone uneven results were obtained. Chrome alum with varying amounts of sulphuric acid up to 21 per cent gave even results. This illustrates again the strong affinity for acid. The chromium in chrome alum is basic; that in dichromate is acid and, like an acid, is absorbed readily; hence the difference in the efficiency of the two salts as chromium mordanting agents. Chrome alum plus 3 per cent tartar gave a good result. Mr. Durfee believes the chromium is reduced inside the wool. The basic chromium itself consumes some of the acid.

Mr. Davies spoke of the inadvisability of the uncommon practice of using 21 per cent sulphuric acid in actual dyeing.

Mr. Fuller thought the sulphuric acid satisfied the acid hunger of the wool and decreased its affinity for dye. One per cent sulphuric acid did not satisfy as well as three per cent sulphuric acid.

Mr. Claffin, in reply to Mr. Davies, questioning the practicality of 21 per cent sulphuric acid, said that the commercial practice represented an optimum and not a maximum. If less per cent than the optimum is employed more can be absorbed, and hence the affinity for dye is greater. An excess of acid lessens the affinity.

Mr. Bume stated that some dyers add the Glauber's salt first, followed slowly by sodium acid sulphate. This gives good results.

Mr. Fuller said he tried this and discarded it for his particular case. He believed the addition of Glauber's first followed by sulphuric acid formed the acid sulphate which modified the action with the wool. The speed of addition was of no account.

Mr. Kaiser recalled cases where sour dyes on ladies' dress goods were dyed from a standing bath four sets a day for three weeks, with satisfactory results. No addition except dye was made. The goods were Bradford finished.

Mr. Durfee asked if the bath exhausted. Mr. Kaiser replied that it did not.

Mr. Bannan confirmed Mr. Kaiser's statement from his own experiences where standing baths were maintained for long periods. Mr. Bannan also spoke of some of the old methods (which sometimes gave even goods) of carbonizing. The belief then was that rapid drying by heat gave the desired results. He spoke of other cases where the direct contact of strong solutions of alkali with the cloth, as by throwing pailfuls into the washer, had subsequently given streaky dyeings.

Mr. Bannan hoped that some future meeting might be related to carbonizing and also wool oils other than olive oil.

Mr. Durfee moved for adjournment at about 8.45 p. m.

The meeting gave a rising vote of thanks to the speakers for their kindness, and was adjourned.

A. K. JOHNSON, Secretary.

## THE DEVELOPMENT OF TESTS FOR THE FASTNESS OF DYESTUFFS

By WALLACE J. MURRAY

(Concluded from page 52 of *Proceedings*,  
March 27, 1922.)

### CHEMICAL TESTS

In 1912 Bancroft proposed the testing of dyed fabrics with hydrogen peroxide as a measure of light fastness. He claimed that the effects of light and hydrogen peroxide were comparable.

### TESTS FOR FASTNESS TO WASHING

Unlike the tests to determine fastness to light, it is easy to control conditions in determining fastness to washing. The main question arising in washing tests is how severe a test should be used.

In the early tests only the method of washing the fabric was specified. Since it was found that no two persons would carry out a test in exactly the same manner, it was necessary not only to specify the treatment but also to compare the sample with standard dyeings of known fastness.

The table at the end of this paper gives a summary of the more important tests which have been recommended, and therefore there is no need to consider them further here.

### TESTS OF FASTNESS TO PERSPIRATION

Perspiration is very variable. Sometimes it is acid, other times it is alkaline. It varies in different persons and animals, and varies in the same person or animal at different times.

Perspiration tests fall into two groups: tests with real perspiration and tests made with solutions to resemble perspiration. Chemical solutions for perspiration tests are often acid, but neutral and alkaline ones have been recommended. They are summarized in the table at the end.

### TESTS OF FASTNESS TO OTHER AGENCIES

The varieties of fastness are always increasing. In 1898 Hertzfeld listed seven types; Lange in 1903 listed twelve types; while the "Echtheitskommission" in 1916 listed nineteen types. Among the more important of these are fastness to water, ironing, and rubbing. For a discussion of these tests the original articles should be consulted (see bibliography previously published).

At the present time our society is working on standard tests for fastness. The writer hopes that this brief review of the work which has been done in the past may be of service to us in establishing our standards for the future. (Tables referred to on opposite page.)

## Proceedings of the American Association of Textile Chemists and Colorists

## SUMMARY OF FASTNESS TESTS

## FASTNESS TO LIGHT

Date	Authority	Light	Measurement	Time	Fiber	Standards or Method of Expression	
1867	Ure's Dictionary	Sun	None			None	
1898	Herzfield	Sun	Standards	Until altered		Medium indigo or turkey red	
1900	Dosne	Sun	Actinometer	Until altered		Rate of distillation from black to white bulb	
1903	Lange	Sun	Standards	Until altered	All three	Various depths of fast dyes of same color as sample	
1907	Meister, Lucius and Brunig, C'ton Dyeing	Sun	None	1 mo. to 1 day	Cotton	Number denoting time	
1911	Krais	Sun	Standards	Until altered		Paper coated with clay and Victoria blue	
1914	G. Schultz	Sun	None	1 mo. to 1 day	All three	None	
(1920 rep.)	Farbstofftabellen						
1914 & 1916	Echtheitskommission	Sun	Standards	Until altered	Cotton	1. Chicago Blue 3. Indoin Blue 5. Benzo Fast Red 7. Sulphur Black	2. Methylene Blue 4. Kryogene Violet 6. Hydrogen Blue 8. Indanthrene Blue
					Wool	1. Indigtine 1A 3. Amaranth 5. Acid Violet 7. Anthraquinone Green	2. Ponceau RR 4. Azo Acid Red 6. Diamine Fast Red 8. Indigo or Naphthalin Green B

## FASTNESS TO WASHING

Date	Authority	Concentration in Grams per Liter			Fiber	Time Temp.		Treatment	Standards
		Grade	Soap	Soda Ash		Min.	°F.		
1867	Ure's Dictionary		Used	None			0	Wash	None
1898	Herzfield	Mild	5	None		20	105	Rub at first, soak, rinse and dry	None
		Severe	5	None		20	130		
1903	Lange	Mild	5	3	Cotton		Warm		None
		Severe	5	3	Cotton	120	Boil		
			5	3	Wool	60			
			5	None	Silk		104		
1907	Meister, Lucius and Brunig	Mild	2	None	Cotton	30	140		None
		Severe					212		
1911	Heermann	Mild	5	3	Cotton	15	140		None
		Severe					212		
1914	Schultz	Mild	2	None	Cotton	30	140		None
		Severe					212		
(1920 rep.)	Farbstofftabellen	Mild	2	0.5	Wool	15	140		
		Severe					212		
1914 & 1916	Echtheitskommission	Mild	2	None	Cotton	30	105	Soak, squeeze out 10 times, rinse, dry	1. Benzopurpurine
		Severe	5	3	Cotton	30	212		2. Primuline
								Knead, squeeze, rinse, dry	3. Indoin Blue
									4. Immedial Indone
									5. Alizarine Red
		Mild	10	0.5	Wool	15	105		1. Orange II
		Severe	10	0.5	Wool	15	175		2. Patent Blue
									5. Palatine Ch'me. Blk.

## FASTNESS TO PERSPIRATION

Date	Authority	Solution	Fiber	Manipulation	Standards
1898	Herzfield	6 c.c. 30 per cent acetic acid per liter of water		Dip at 100° F., rub, dry without rinsing at 68-77	None
1903	Lange	None	All three	Place under saddle	None
1904	Davidis	5 grams soap and 3 c.c. ammonia per liter		Wear on chest or under arms	None
1907	Meister, Lucius and Brunig	50 acetic acid per liter	Cotton	Soak 10 min., squeeze dry	None
1914	Schultz	50 grams of 8° Be. acetic	Cotton	Treat 1 hour at 104° F.	None
(1920 rep.)					
1914 & 1916	Echtheitskommission	5 c.c. 30 per cent ammonium acetate	Cotton	Treat 1 hour at 104° F.	None
		1. Same as cotton	Wool	10 min. at 175° F., dry without rinsing	1. Chrysophenine
		2. 100 grams salt per liter			3. Diamine Black
				1. Same as cotton	5. Indanthrene Blue
				2. Spot, dry, brush off	1. Azo Yellow (meth- od 1 only)
					3. Amaranth
					5. Palatine Ch'me. Blk.



### NOTICE FROM THE SECRETARY

#### APPLICATIONS FOR MEMBERSHIP IN THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

All individuals who believe that they are eligible for membership in the Association and are desirous of affiliating with the organization can communicate with the Secretary, who will gladly furnish application blanks and extend to them every possible assistance.

It is desirable that members of the Association should make an effort to interest all those who they believe would make desirable members.

The Secretary will at all times be pleased to provide members with as many application blanks as may be desired.

W. E. HADLEY, Secretary,  
5 Mountain Avenue, Maplewood, N. J.

### CHANGES OF ADDRESS

The following changes and corrections in names and addresses of members should be noted:

E. M. GLENNON  
80 Mechanic Street, Westbrook, Me.

### NOTICE OF MEETINGS

The next meeting of the Council will be held Friday, May 12, 1922, at the Engineers' Club, Boston, Mass., at 4 p. m.

A meeting of the Research Committee will be held at the same place at 4.30 p. m. of the same day.

Members wishing to bring any matters to the attention of these meetings will please communicate with either the President or the Secretary.

### Electrometric Titration as a Means of Determining the Free Sodium Sul- phide in a Sulphur Black Dye Bath<sup>1</sup>

By W. WALKER RUSSELL  
with SAMUEL T. ARNOLD

THIS work<sup>2</sup> was undertaken with the idea of finding a quick and accurate method for determining the free sodium sulphide content of a standing sulphur black dye bath. It is of importance to have a means of determining the sodium sulphide content of a standing sulphur

<sup>1</sup> This paper is an abstract of work done by W. W. Russell in partial fulfillment of the requirements for the degree of Master of Science at Brown University, 1920.

<sup>2</sup> Acknowledgment is made to W. H. Cady, of the U. S. Finishing Company, for suggestions in this work.

dye bath in order that the dyestuff, which has precipitated on standing, may be again brought into solution, ready for dyeing, by the addition of a suitable amount of sodium sulphide. By means of the electrometric method to be described it is possible to ascertain the per cent of sodium sulphide present in a bath at any time and, knowing this, sodium sulphide may then be added to give the desired concentration.

Several methods have previously been offered for this determination, among which is that of R. N. Len,<sup>3</sup> which involves the preliminary precipitation of the dissolved dye, or its absorption by cellulose; also that of H. Swann in which the hydrogen sulphide evolved from the dye bath is distilled into standard iodine solution. In the latter method, however, the presence of sodium sulphite, as an oxidation product of the sulphide, has been shown to affect the amount of hydrogen sulphide evolved.

By the use of electrometric titration, the intention was to eliminate the necessity of precipitating the dye, or of a distillation, and also of an outside indicator.

The electrometric apparatus used is essentially that described by H. S. Roberts,<sup>4</sup> and was built by the writer at this laboratory. To those who may be interested in an apparatus of this type, it may be said that with the material at hand in the commercial laboratory, it should be possible to build a satisfactory apparatus for about \$30. This represents the cost of the new materials needed. The apparatus consists principally of two electrodes (one platinum, and the other a calomel half cell), which are immersed in the solution to be titrated. The E.M.F. of the cell thus formed is balanced, with the aid of a galvanometer, by means of a sliding resistance coil against two dry cells. An arbitrary value of the resistance employed is given by a scale of equal parts placed beneath the slide bar of the resistance coil. Changes in the concentration of the cell formed by the two electrodes dipping into the solution during titration, are indicated by movements of the galvanometer needle. The largest permanent deflection of this needle is taken as indicating the end point.

Iodine was selected as the most suitable oxidizing agent for the determination of the sulphide ion, as previous work by the writer with iodine, using the electrometric apparatus, had shown this apparatus to be even more delicate than starch solution for locating end points in iodimetric titration.

*(To be concluded.)*

<sup>3</sup> R. N. Len, "Dyers & Colourists' Journal," No. 30, 1914, page 277.

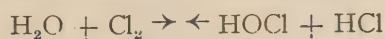
<sup>4</sup> H. Swann, "Dyers & Colourists' Journal," No. 33, 1917, page 146.

<sup>5</sup> "Journal of the American Chemical Society," Vol. XLI, No. 9, September, 1919. Electrical apparatus for the use in electrometric titration.

## NOTES ON HYPOCHLOROUS ACID AND CHLORINE, WITH COMPARISONS OF THEIR BLEACHING ACTION

(Continued from page 330.)

persists very strongly. The solution also gives only a slight precipitate with silver nitrate, which, however, rapidly increases in amount. The reaction—



has evidently not proceeded very far from left to right even when the color has disappeared. The addition of silver nitrate to the solution causes the immediate removal of the hydrochloric acid, and then the reaction proceeds to a finish, all the chlorine disappears, and the solution smells of hypochlorous acid. (For a description of further changes in this solution see previous pages.)

Even when chlorine water is diluted with fifty or a hundred times its volume of water, so that it becomes N/500 or N/1,000, the solution smells distinctly of chlorine, and experiments on the bleaching action of these very dilute solutions also show that they contain a considerable proportion of free chlorine.

With very dilute solutions such as these, experiments on the activity of bleaching of chlorine and hypochlorous acid can be made much more satisfactorily than with stronger solutions, as their action upon such a coloring matter as Indigo, for example, is sufficiently slow to enable reliable comparisons to be made. Many comparative experiments have been made (generally using a dilute solution of Indigo-sulphonic acid, but also with other coloring matters) with solutions of chlorine and hypochlorous acid diluted to N/500, and the chlorine invariably bleaches more rapidly than the hypochlorous acid. Thus, while 20 cc. of the solution of chlorine bleached a measured volume of the Indigo solution in fifteen to twenty seconds, the hypochlorous acid always took two or three times as long. Similar differences in the time of bleaching were observed with Cochineal, Crystal Violet, infusion of Red Rose leaves, and Litmus; (the curious action of very dilute chlorine water upon Litmus will be described later).

The bleaching action of dilute chlorine water is considerably accelerated by the addition of hydrochloric acid, which reverses the action of the chlorine on the water, thus liberating more chlorine. Naturally, also, the addition of hydrochloric acid to dilute hypochlorous acid accelerates its bleaching action in the same way. In fact, according to the reversible action—



the addition to hypochlorous acid of just the right amount of hydrochloric acid ought to produce a mixture which would behave exactly like dilute chlorine water. If a solution of N/500 hypochlorous acid is mixed with half its

volume<sup>3</sup> of N/500 hydrochloric acid, the resulting mixture, in its bleaching action, appears to be absolutely identical with N/500 chlorine water mixed with half its volume of water (to bring it to the same volume as the mixed acids). The two solutions bleach at exactly the same rate.

Other acids than hydrochloric do not stimulate the bleaching action of this very dilute hypochlorous acid, as they do with the stronger solutions (see previous reference). In fact, as already pointed out, the solution of Indigo used in comparing the times of bleaching was a solution in sulphuric acid.

The results of the comparative bleaching experiments above described leave no doubt that, considered simply as a bleaching agent, chlorine is more active than hypochlorous acid.

S. H. Higgins, however, in various papers (*Chem. Soc. Trans.*, 1912; *J. S. D. C.*, 1912, etc.), and more recently in his book on Bleaching,<sup>4</sup> insists that "chlorine is a comparatively weak bleaching agent," and that, in practically all cases of bleaching by hypochlorites, hypochlorous acid is the active agent. His conclusions were drawn from the fact, which he pointed out in 1912, that linen is hardly bleached at all by chlorine. In a paper published by the author, *J. S. D. C.*, in April, 1912, entitled "The Action of Bleaching Agents in the Colouring Matter of Linen," it was pointed out that not only has free chlorine very little effect on the coloring matter of linen, but that that coloring matter is equally unaffected by pure hypochlorous acid. The conclusion arrived at was that most of the coloring matter of linen is abnormal in its behavior with bleaching agents, and that, in order to enable either chlorine or hypochlorous acid to bleach linen, it was necessary to add a certain amount of alkali as well; that, in fact, while neither of those substances alone will bleach linen, a hypochlorite will. As a solution of bleaching powder contains a hypochlorite, it will, naturally, bleach linen.

In a further paper (*J. S. D. C.*, March, 1914) on "The Action of Bleaching Agents on Various Natural Colouring Matters," it was pointed out that the anomalous behavior of the coloring matter of linen was shared by a part of the coloring matter of cotton, and by the coloring matter of jute. Nearly all the experiments on bleaching which Higgins has described have been done with unbleached linen, and it is plain that little reliance can be placed upon conclusions as to the bleaching activity of chlorine and hypochlorous acid which have been drawn

<sup>3</sup> While a normal solution of hydrochloric acid contains 36.5 grms. per liter, a normal solution of hypochlorous acid (measured by its oxidizing power) would only contain  $\text{HOCl} \div 2 = 26.25$  grms. per liter, so that a given volume of N/500 hydrochloric acid would contain twice as many molecules as the same volume of N/500 hypochlorous acid. Consequently, if the two dilute acids were mixed in equal volumes the resulting mixture would not behave like chlorine water, but like chlorine water to which some hydrochloric acid has been added.

<sup>4</sup> "Bleaching," by S. H. Higgins, 1921. Manchester University Press.



from experiments made with a coloring matter which is unaffected by either of them.

But Higgins continues to state that linen is bleached by hypochlorous acid, and, as a proof of this, he mentions two experiments. In the first he simply added boric acid to a solution of bleaching powder and found that the mixture bleached linen. Now such a mixture would certainly contain both hypochlorous acid and free chlorine, but it would also contain a considerable amount of unaltered calcium hypochlorite, and it is this which bleaches the linen. If the hypochlorous acid were distilled off from the mixture, the pure substance so obtained would not bleach linen.

In his second experiment Higgins added hydrochloric acid to a solution of bleaching powder until it turned yellow owing to the liberation of chlorine; he then divided the solution into two parts, and to one added precipitated calcium carbonate (to produce hypochlorous acid). He placed some boiled linen in both solutions and found that the one to which the calcium carbonate had been added the far greater action (Higgins, *J. S. D. C.*, July, 1914). Here again the experiment is rendered worthless as evidence of the superior bleaching power of hypochlorous acid by the fact that pure hypochlorous acid was not used. This experiment has been repeated, but instead of putting the boiled linen into the mixture, the hypochlorous acid was distilled off before use, with the result that the bleaching action was very slight indeed. It was further found that if hypochlorous acid, prepared either as just described or by distilling dilute bleaching powder with boric acid, is mixed with a little precipitated calcium carbonate, this has the same effect as the addition of a little alkali, and enables it to bleach linen. It has been pointed out that to enable either chlorine or hypochlorous acid to bleach linen some hypochlorite must be present as well, and it is evident that by the addition of calcium carbonate to either chlorine water or hypochlorous acid the requisite amount of hypochlorite is produced.<sup>5</sup> Thus the bleaching of the linen in Higgins' experiments is fully and satisfactorily accounted for, and their evidence as to the superior bleaching activity of hypochlorous acid is of no value.

In order to account for some of his results, Higgins has recourse to what he calls "latent" chlorine. But this is unnecessary in view of the fact that the coloring matter of linen (together with part of that of cotton and of jute) is abnormal with regard to the action of bleaching agents.

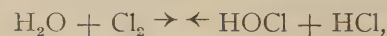
#### THE ACTION OF VERY DILUTE CHLORINE WATER ON SOLUTION OF LITMUS

When 40 to 50 cc. of very dilute chlorine water (5 to

<sup>5</sup> Since the above was written I have found that if hypochlorous acid (about N/10) is shtaken up for some time with precipitated calcium carbonate, some of the latter is dissolved. If the solution is filtered, the clear liquid gives a considerable precipitate with ammonium oxalate, showing the presence of calcium in it. Hypochlorous acid has generally been considered too weak an acid to decompose calcium carbonate.—R. L. T.

10 cc. of freshly prepared chlorine water to a liter of water, when the solution would be from N/2,000 to N/1,000) are added to a few cc. of Litmus solution, also freshly made, the liquid at once becomes bright red, but in a few seconds the color changes to purple, and then, if sufficient chlorine water is presently, slowly disappears.

The condition of equilibrium in the chlorine water is represented by the equation—



and the bright red color which is produced at first is caused by the hydrochloric acid present in the solution, as hypochlorous acid has very little, if any, reddening effect upon Litmus. Plainly, when the color has changed to purple, the hydrochloric acid has disappeared from the solution. A probable explanation of this disappearance of the hydrochloric acid appears to be that the free chlorine in the solution is immediately used up in bleaching some of the Litmus, and, as it disappears, the reaction represented above is reversed and the hydrochloric acid also disappears, producing with the hypochlorous acid more free chlorine, which is used up in bleaching the coloring matter.

If this explanation is correct, then plainly the time-honored explanation of the bleaching action of chlorine (the decomposition of water by the chlorine and the consequent formation of hydrochloric acid) cannot be correct—in the case of the bleaching of Litmus at any rate. Apparently the chlorine itself acts directly upon the coloring matter.

This experiment also yields an additional proof of the superior bleaching activity of chlorine over hypochlorous acid. If the latter, and not the chlorine, first attacked the coloring matter, and the amount of hypochlorous acid in the solution diminished, this would disturb the equilibrium of the solution in the opposite direction, and so more hypochloric acid would be produced. Also, hypochlorous acid, when it bleaches, actually yields hydrochloric acid, and this would add still further to the amount of that acid in the solution.

From the results of the experiments described in this paper, it seems plain that the active bleaching properties generally attributed to hypochlorous acid are for the most part imaginary, and are not characteristic of the pure substance itself.

#### DISCUSSION

In the discussion which followed, S. H. Higgins said he thought that Mr. Taylor and himself had been working on rather different lines. Mr. Taylor admitted that chlorine had little action on the coloring matter of linen, and the bleaching of this coloring matter was of more interest than the bleaching of Indigo. Although in the case of the cotton fiber there was less coloring matter present, and it was not possible to observe the distinction so well, all the results obtainable with linen were obtainable with cotton. Other observers have supported the statement that hypochlorous acid is the best bleaching

agent for textile fibers. With regard to the tests with Turkey Red and Indigo, he (the speaker) had already conceded the point that chlorine was the best bleaching agent. With regard to the boric acid and bleaching powder solution, after adding the boric acid the solution, after adding the boric acid the solution was colorless. Therefore there was no chlorine present.

R. L. Taylor said his statement was that if boric acid was added to a solution of bleaching powder, both hypochlorous acid and chlorine were formed. In a former paper he had described the experiment of sending air through a solution of a mixture of boric acid and bleaching powder and driving out from it both chlorine and hypochlorous acid. The quantities obtained were given.

Mr. Higgins said that when there was no coloration in the solution it could not be said that chlorine water was obtained. When acid was added to a solution without any yellow color resulting, he thought it could be concluded there was no free chlorine present.

J. R. Hannay thought they would all admit that the real bleaching agent was oxygen, and not either chlorine or hypochlorous acid. The question was which was the best intervening agent to use—chlorine or hypochlorous

acid—in order to activate the oxygen. Mr. Taylor seemed to have advanced pretty conclusive evidence that chlorine, under given conditions, was a much more active agent in liberating the oxygen which was required to perform the bleaching. With regard to the decomposition of hypochlorous acid in the presence of silver nitrate, surely when silver nitrate was added to a hypochlorous acid solution, and there was a gradual decomposition with a deposition of chloride of silver, there was freed in the solution a certain amount of nitric acid which acted as a strong oxidizing agent on the hypochlorous acid left in the solution. Apparently Mr. Taylor quite overlooked that part of the reaction with reference to his experiment with hypochlorous acid and silver nitrate.

The lecturer remarked that the solutions were really too dilute for nitric acid to have any oxidizing effect, being only decinormal solutions to begin with.

Mr. Hannay could hardly agree with Mr. Taylor's statement. He thought that with a strong oxidizing agent like nitric acid the action of the acid would be proportional to the strength of the solution.

Mr. Taylor said that the hypochlorous acid was itself an oxidizing agent under certain conditions.

## Scouring and Milling

Classification of Methods—Scouring Methods—Saponification Scour—Fancy Worsteds Scour—"Low-Goods" Scour—Guidance from Hypothetical Cases

By J. SCHOFIELD, B.Sc., A.R.C.Sc.

*From a paper read before the South of Scotland Section of the Textile Institute, and printed in the "Journal" of the Institute*

IT is possible to classify the various methods of textile scouring in more than one way. On the wool side of the textile industry, piece scouring might be divided, according to the materials worked on, as: (1) Scouring of high-grade woolens; (2) scouring of worsteds; (3) scouring of low-grade goods. These differ primarily in respect of the kind and quantity of oiling applied to the fabrics. Thus on the better class woolens there would be heavy oiling of, say, 10 per cent on the weight of the wool, and consisting of good quality wool lubricant containing in general much free fatty acid. Contrasted with these are the good quality worsted cloths carrying light oiling of 2 to 3 per cent, and of a neutral or nearly neutral type. In the low-grade goods the oilings are again heavy and of a worse type, often with large percentages of mineral oil; here, also, there are the special difficulties of these fabrics to be detailed later.

1. Solvent scouring, in which oily and fatty matters are extracted from the fiber by the direct solvent action of benzene, petrol, etc.

2. Saponification scouring, in which the free fatty

acids of the oils are converted into soaps in the scouring machine by the action of the alkali.

3. Emulsification scouring, in which the greasy dirt is removed mechanically by the formation of a frothy lather or emulsion; the wetting-out power of this lather causes the breaking up and detachment of the oil, etc., from the surface of the wool fiber. This is obviously a physical process as contrasted with the chemical process of scouring by saponification.

These methods are ideal statements of types of scouring to which practical methods conform more or less. Thus, most scouring of raw wool in the usual bowls is of the emulsification type. The scouring of fancy worsteds by weak alkali and some soap is a further example of emulsification working.

On the other hand, good woolens carrying oil with large percentages of free fatty acids may be scoured throughout—and well scoured—by alkali alone; sufficient soap is formed in the machine to use up the oiling both directly as soap and indirectly as emulsion. This is a typical saponification scour. The scouring of low-



grade goods has usually to be of a composite kind, which we shall consider later.

### SAPONIFICATION SCOUR

It is most useful to discuss first the saponification scour, as it well illustrates the principles concerned, is scientifically justifiable at all stages, is easy to carry out in practice, and, finally, is thoroughly efficient in its results. It is completely described on page 120 *et seq.* of the author's book on "Scouring and Milling" as a standard scour on heavily oiled woollens. It is an obvious truism that the oiling for wool lubrication at the spinning end and the subsequent scouring operations must be intimately connected. In the present case of good woollens it is assumed that the spinning oils are the usual "oleins"—i. e., crude oleic acid of high saponifiable quality with some mineral oil; say, 20 per cent—commonly employed in the trade. In this case the wool oils will have large amounts—possibly 40 to 60 per cent, or even more—of free fatty acids; that is, these fatty acids will not be combined, as in the neutral animal and vegetable oils, with glycerine, but are free to enter into chemical union with the soda carbonate to form soap. This is a reaction which is possible at moderate temperatures, and hence the scouring of such goods is quite practical by alkali alone as follows:

Stage 1.—Run in soda ash solution of 5 to 6 deg. Tw. at about 90 deg. Fahr., using, say, 20 gallons per 100 pounds of wool. Let this saponify, running for ten minutes or so, and then without addition of water open the sud box and let the dirty emulsion away to the drain. When the machine is thus emptied—

Stage 2.—Add alkali as before, about 5 gallons per 100 pounds of wool, scour for twenty minutes or so, and—

Stage 3.—Wash down; warm water at first, and slowly, then stronger and colder.

The principles of this saponification two-stage scour are:

1. Attack by alkali on the free fatty acids of the spinning lubricants with formation of soap.

2. The resulting emulsification detaches the superficial dirt of the fiber, and this is removed at an early stage from the machine.

3. This stripping action is intensely assisted by the generation *in situ* of carbonic acid gas by the action of the fatty acids on the alkali in forming soap—an extremely powerful detergent factor peculiar to saponification as contrasted with purely emulsification scouring.

4. The use of a clean and unexhausted scour, of good diffusibility, for the deeper penetrated dirt of the fiber, which requires longer continued action for its saponification and emulsification. It must be remembered that colloids do not diffuse through colloids; soap as soap is not a penetrant of the wool fiber. But

a crystalloid substance like soda carbonate possesses high diffusibility and can pass into the actual tissue. The method here described is probably the most efficient of all scours on wool goods in point of cleanliness in the resulting fabric. Seeing that much of the free fatty acid of the wool oil is oleic acid, the resulting soap formed in the machine is a sodium oleate. Such soaps are known to be particularly soluble at comparatively low temperatures, hence their scouring properties are enhanced, and, further, their easy removal from the fabric is assured. It is instructive to consider this scour as an ideal to be followed as far as practicable in other cases.

Consider now the scouring of high-class worsteds. Here the oiling is not only much lessened in quantity but is usually of a more neutral character. Now, the saponification of a neutral oil, even when of animal or vegetable origin, cannot be effected by carbonated alkalies at ordinary scouring temperatures. Hence a straightforward saponification scour is not feasible on these goods, and the usual process is as follows:

### FANCY WORSTEDS SCOUR

Alkali of 2 to 4 deg. Tw., in accordance with the reduced oiling, together with some soap from the outset, the idea being to work up an emulsion which, by diminished surface tension or increased wetting-out capacity, will detach the oil and dirt and float them away from the fabric.

It would be interesting to know the practical reasons, if any exist, why worsted spinners do not use oils with large fatty acid content, as do their brethren on the woolen side. The addition of small amounts of free fatty acid to mineral oil for machine lubricants has been found to increase their efficiency, diminishing the friction in some cases to one-half that of mineral oil alone. In the textile case, the presence of free fatty acids enormously facilitates the work of the scourer, and it is therefore important to know what are the objections on the worsted side. It is, however, an actual fact that many worsted "oleines" contain moderate percentages of such acids. In these cases it is possible and often superior in practice to conduct a worsted scour thus:

1. Run on alkali 2 to 4 deg. Tw., warm, for ten minutes, and then, without any addition of water, lead this off to the drain.

2. Add more alkali—preferably weaker—and some soap, and complete the scour.

3. Wash off, warm and gently at first, colder later.

It must be noted that overstrong alkali solutions prevent the proper solution of the soap; it is far preferable to work with weaker solutions and in more than one stage.

### THE "Low-Goods" SCOUR

In this class of trade the unfortunate scourer meets

with all his difficulties in their worst forms. There may be excessive bleeding of color due to loose dyeings, poor dyestuffs, dyeing in the grease, etc., low grade oilings often with much mineral oil, sizings, recovered wools, flock wastage, and the rest. In many cases the conditions to be met are incompatible—e. g., the necessity of scouring at low temperatures to prevent bleeding, thus losing the advantage of the decreased surface tension (i. e., enhanced wetting-out power) of a warm scour.

The surface tensions of water at various temperatures are given in a paper in "Science Abstracts," October, 1921:

Temperature	Surface Tension
0 deg. Cent.	76.7
18 " "	75.6
36 " "	70.0
69 " "	64.8
89 " "	60.9

Thus, taking 36 deg. Cent. or 97 deg. Fahr. as a scouring temperature, there would be a gain of nearly 10 per cent in lowered surface tension as compared with ice-cold water. Perhaps, however, the bleeding of color must be prevented even at the expense of some perfection in the scour.

The low-grade oilings offer in these goods the maximum of difficulty. There is often much mineral oil, which tends to prevent the formation of proper emulsions, and, being itself unsaponifiable, is removable only by a process of emulsification. There is usually an undue proportion of other unsaponifiable matter and a corresponding lack of free fatty acids; a sufficiency of these would in many cases simplify the scouring of the goods, enabling at any rate the first stage of a saponification scour to be effected. Many so-called "black oils" are excellent from the scourer's point of view owing to their high content of free fatty acids; much of the scouring of low-grade goods would be vastly improved by a judicious addition of suitable black oil to the spinning lubricant. It is undoubtedly desirable that wool oils should be specified in terms of free fatty acid, in addition to—or in place of—total saponifiable matter. It is free fatty acid, and not merely neutral saponifiable oil, which is of primary importance at the scouring end.

It is, therefore, not possible at present to lay down the exact lines of a low-goods scouring operation. If the oiling can be modified in the direction of securing a proper quantum of free fatty acids, then a two-stage scour of the following type may be practised:

1. Run in warm alkali 5 to 6 deg. Tw. if the colors do not bleed; otherwise, cold. Scour from ten to fifteen minutes, and, without added water, open the sud box and pass this away to the drain.

2. Add further alkali, weakened, together with some soap, to build up an emulsion; scour out.

3. Wash down, preferably with warm water at first, if the dyeings will permit.

There are some special points in the practice of low-goods scouring which merit further discussion.

It is possible that slight additions of caustic soda to the first stage of the scour may be found useful. Caustic as against carbonated alkali will saponify free fatty acid in the cold; it is, further, more active in the softening of possible hardness in the water. But the concentration of such caustic alkali must be small in view of its strong tendering action on the wool fiber; a strength of perhaps not more than 2 ounces in 10 gallons of the scour may be tried. Further experiments are necessary. Ammonia in scouring is invariably used in the form of hydrate and never as carbonated alkali.

Another question bearing on the low-grade scour more particularly is the use of the so-called "solvents." There are a number of substances capable of dissolving oil or grease quite freely—e. g., ether, chloroform, carbon bisulphide and tetrachloride, alcohol, benzene, petrol, turpentine, and certain chlorinated hydrocarbons such as trichlorethylene and tetrachlorethane. When the various physical and chemical properties of these bodies are compared, it is seen that only a few—viz., alcohol, carbon, tetrachloride, tetrachlorethane, etc.—are adapted for employment as adjuncts to a textile scour. And it further appears that their true utility is not the dissolving of oil or grease, but their property of lowering the surface tension of the scour. If experiments by the drop pipette or by soap bubbles are conducted with solutions containing these bodies, it will be found that there is a reduction of the surface tension of the scouring liquor beyond that attained by the use of soap. Hence, there is scientific justification for their use under proper conditions, and further experience is necessary to determine which substance, and under what conditions, the highest efficiency is obtained. Other things being equal, the property of perfect miscibility with water possessed by a substance like alcohol is to be desired as against bodies like tetrachlorethane, which require emulsifying agents such as sulphonated oils to assist their dissemination throughout the scouring liquor. The whole question is one requiring further investigation.

#### GUIDANCE FROM HYPOTHETICAL CASES

Some useful notions respecting the principles of scouring and the proper modes of procedure may be gained by considering certain extreme cases not necessarily met with in practice. Suppose fabrics lubricated as follows:

1. Oiled with pure mineral only.
2. Oiled with pure neutral animal or vegetable oil only.
3. Oiled with pure free fatty acids only.
4. Lubricated with dilute glycerine.



Taking the last case first, a simple steeping and working in warm water would cleanse the fabric. The cloth oiled by free fatty acid could be completely scoured by the use of alkali alone. The fabrics having either mineral oil or neutral glycerides would require soapy emulsions, perhaps repeated several times; or, alternatively, extraction by solvents.

There are many other points in scouring theory worthy of close attention. The subject of detergent materials is in itself a wide one, embracing such questions as—

1. The proper strength of alkali solutions; and of soap solutions.
2. The temperature of scouring.
3. The best kinds of soaps for textile work.
4. The function of ammonia in the scour, and its utility.
5. The limits of mineral oil in wool lubrication; the penetration of such oils as compared with oleins, etc., into the fiber tissue.
6. The use of resin, silicate of soda, etc., in soaps.
7. The limits of hardness of water for textile purposes.
8. The consistency of the scour: should a scouring liquor be thick and creamy, or thin and sloppy?

## Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: \*Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

1394.‡—A commercial agent in Australia desires to secure the representation of firms for the sale of silk goods. No reference offered.

1367.\*—A merchant in Arabia desires to purchase and also secure an agency for unbleached piece goods, drills, and jeans. Quotations should be given c. i. f. port of Arabia. References.

1357.\*—A firm in Wales which caters to the steamship service desires to purchase ship stores of all kinds, food-

stuffs, ship tackle, oils, canvas, paints, hardware, etc. Quotations should be given c. i. f. Welsh port. Reference.

1353.\*—Agencies are desired by firms in Italy for the sale of raw cotton in bales. Quotations should be given c. i. f. Italian port. References.

1359.\*—A mercantile firm in Australia desires to secure agencies from manufacturers for the sale of hardware, groceries, plated goods, and textiles. Quotations should be given c. i. f. Australian port. Terms: Cash against documents. References.

1517.\*—The purchase is desired by a furniture company in Canada of upholstered furniture, in tapestry and leather; walnut, mahogany, and quartered-oak bedroom suits; tapestries, cretonnes, etc., for furniture coverings and draperies; floor coverings; kitchen cabinets; and electric sweepers. Quotations should be given f. o. b. Boston. References.

1428.†—A mercantile firm in Australia desires to secure an agency from manufacturers for the sale of silk piece goods, for which there is a good market in that country. Terms: Cash against documents in New York.

1430.\*—An agency is desired by a firm in Italy for the sale of mixed cotton and silk cloths (prints), cotton and silk hosiery, and velvet. Quotations should be given c. i. f. Italian port. References.

1432.\*—A general agency is desired by a merchant in Switzerland for the sale of novelties in electric machinery, raw cotton, cotton cloth, and foodstuffs such as rice, coffee, and canned-meat products. References.

1475.†—A firm of manufacturers' agents in South Africa desires to secure the representation of firms for the sale of cottonades. Reference.

1477.‡—The purchase is desired by a firm in India of piece goods of every description, millinery, hosiery, perfumery, etc. Quotations should be given c. i. f. port of India. Reference.

1478.\*—There is a market in Italy for toilet articles in general, soap, perfumery, brushes, and household hardware. Quotations are requested c. i. f. Italian ports. References.

1479.\*—A mercantile firm in Canada desires to secure an agency for the sale of novelty specialties, silk goods, ribbons, neckwear, velvets, laces, curtains, ready-to-wear lines, and specialties in hardware, drug, and grocery trades. Quotations should be given f. o. b. factory.

1509.‡—A sales-agency firm in South Africa desires to secure the sole agency of firms for the sale of hosiery,

boots and shoes, toilet requisites, cotton goods, hardware, and general merchandise. Reference.

1511.\*—An agency is desired by a mercantile firm in Ireland for the sale of oilcloths and rubber shoes. Quotations should be given c. i. f. Belfast and Dublin. Reference.

## Recent Patents

### Knitting Machine

(1,406,253; February 14, 1922)

HERBERT T. BALLARD, Norristown, Pa.

This relates to a new fabric and to the method and means for making the same. The invention is carried out on a rib knitting machine with multiple feeds. Changes are made in the stitch—say, from plain to tuck and from tuck to plain—and these changes are made to advance in position around the fabric in one direction at one feed as the courses are knit at this feed, whereas at another feed, and consequently in different courses, the said changes are made to lag and thus these changes take place spirally around the fabric, one change making the spiral advance in certain courses from wale to wale or groups of wales, while the other changes make the spiral lag in the other courses and from wale to wale or groups of wales.

The illustration is a front view, developed, of a number of feeds, including the improved mechanism.

The figure 1 indicates the cylinder and 2 the dial of a rib knitting machine.

There are shown ordinary feeds at A, B and special feeds at C, D.

At each of these feeds there is a thread guide 3 of ordinary form.

At feed C is mounted a toothed wheel 4, the teeth of which mesh with the needle stems and the wheel is therefore rotated. If the cylinder has 324 needles, the number of teeth in the wheel is made such that it is not an exact divisor of the number of needles in the cylinder. For instance, the number of teeth in the wheel is sixty-five. This will not divide exactly into the whole number of needles in the cylinder; but, on the contrary, there will be one needle less than the number required to make the number of needles a multiple of the number of teeth, and thus for each revolution of the needle cylinder the revolution of the toothed wheel 4 will not synchronize therewith, in the sense that the revolutions will start on the same needle, but as in the case just mentioned, where there is one needle less than the number necessary to make a complete revolution of the wheel, said wheel will lag in respect to the revolution of the needle cylinder. This wheel carries cams in the form of segments

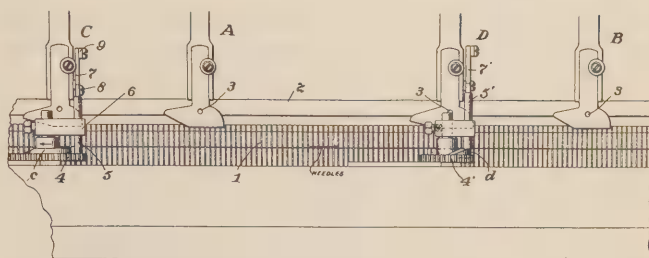
standing up from the surface of the wheel. These cams alternate with intervening spaces so that the cam path is divided into four segments, two high portions alternating with two low portions. These cams operate to change the stitch from plain to tuck and from tuck to plain, and for this purpose a rod 5 rests on the cam path, it being guided vertically by a block or bracket 6. The upper end of this rod is designed to operate a lever 7 pivotally mounted at 8 to the yarn guide bracket and having a link 9 extending through a post extending through a slot in the dial cap and connected at its lower end with the ordinary wing cam of the dial set, this being the cam which, in ordinary practice, projects the needle to take the new yarn.

When the rod 5 is lifted the wing cam will be retired so that the needles will be projected only far enough to take the new yarn without causing the latches to shed the loops to a point back of them, and hence tuck stitches will be formed on these needles.

When the low part of the cam comes under the rod 5 the latter will fall and the wing cam will be drawn forward by a spring and the needles will be advanced to knit.

These changes, as above stated, will lag in respect to the revolutions of the cylinder, in the present instance one needle at a time, though inventor does not limit himself in this particular.

At the feed D, however, the wheel 4' is provided with forty-six teeth to engage the needles, and as this



number divides into 324 unevenly, there being two needles over in the remainder, it follows that the wheel 4' will be advanced a distance of two needles at each revolution of the cylinder, and hence the changes consequent upon the operation of this feed will be out of time with any given wale and may be said to advance in respect thereto. The wheel 4' is provided with a single cam *d* extending over an angle occupied by twenty-three needles, it being one-half of the circuit of the wheel. This cam operates upon a rod 5', which in turn operates a lever 7' having a connection, similar to that described above, to the post of a wing cam.

The two plain feeds at A, B merely knit in the ordinary manner by casting off what loops there are on the needles and draw new loops. These feeds alternate with the special feeds above described. At this special feed D when the rod 5' is lowered consequent upon the low part of the cam coming under it, ordinary knitting is done there.



In the resulting fabric, a diagonal of spiral striped formation is produced with the stripes running in opposite directions, and diamond-shaped formations at the intersecting points, this result being due to the lead and lag of the changes in the stitch and to the fact that the fabric at one feed is modified by the intermediate courses knit at the next feed.

By using different colored yarns at the different feeds the changes in the fabric are made pronounced in appearance.

The difference in the character of the stitches will also have the effect of distorting the courses and wales from straight lines and they will have the zigzag structure shown.

By using three feeds the wheel with sixty-five teeth would be used, also the forty-six toothed wheel and the feed B. The feed A would be omitted.

This machine will give one diamond block of the fabric structure in which the order of knitting in the courses would be one tuck, one knit, and one tuck. The second block would be made up of one tuck, one tuck and one knit, and the third block would have one course knit, one knit, one knit.

With the four-feed organization the order of the courses would be as follows: One block would have course one tuck, one knit, one tuck and one knit.

The second block would be one tuck, one knit, one knit and one knit.

The third block would have all the courses of ordinary knit stitch.

The sixty-five-tooth wheel makes approximately five revolutions to each course. As it has two cams, it will knit ten spaced apart plain portions in each course because the preceding feed B is a plain feed.

Between these plain knit portions the needles will take on a second loop, and these will be cast at feed A so that at this feed the tuck wales will be completed in the same course. This would give a diagonal tuck stripe and a plain knit stripe alternating but running diagonally one way if only these two feeds were used.

At the next feed D at which the smaller wheel is located, this wheel, having forty-six teeth, will make approximately seven revolutions to one round of knitting, and as it has one cam there will be seven changes in the wing cam to knit seven times and to tuck seven times in one course.

The machine has 324 needles, as above stated. The wheel at feed C has sixty-five teeth. It has two cams; and as the number of needles is not a multiple of the number of teeth the wheel changes its position with respect to the needle cylinder at each revolution of the latter, so that it will not start its series of revolutions per revolution of the cylinder on the same needle but, on the contrary, on the next needle.

This wheel may be said to lag in respect to the revolutions of the cylinder, there being one needle lacking in the cylinder, of a sufficiency to make its five revolutions even with those of the cylinder.

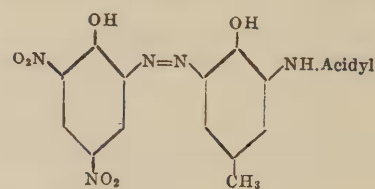
The fabric produced is the subject of another application, filed September 23, 1921.

### Ortho-orymonoazo Dyes

(1,408,363; February 28, 1922)

WERNER LANGE, Berlin-Friedenau, Germany (assignor to Actien Gesellschaft fur Anilin Fabrication)

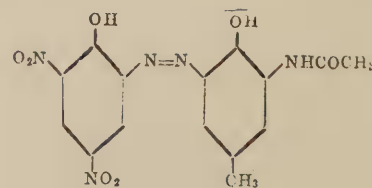
Describes new azo dyes derived from picramic acid and a 2-acidylaminophenol substituted by an univalent radical in the 4-position. The constitution of the new dyes in the free state may be expressed by the general formula:



X meaning an univalent radical.

The dyes furnish on wool with aid of chromium mordants olive-brown tints of an excellent fastness to washing, to milling, to potting and to light. They are in the shape of pulverized dry sodium salts dark powders, soluble in hot water with a brown coloration, becoming more reddish by the addition of soda lye. From the solution the dyes are precipitated in the form of brown flakes by an acid. Concentrated sulphuric acid dissolves the dyes to a red-brown solution. The dyes are destroyed by strong reducing agents yielding 2,4,6-triaminophenol and a 2-acidylamino-6-aminophenol derivative.

In order to illustrate how the dyes may be manufactured, the following example is given, the parts being by weight: 19.9 parts of picramic acid are diazotized as usual and coupled with a solution of 16.5 parts of 4-methyl-2-acetylaminophenol, alkaline by sodium carbonate. When the combination is complete the dye is salted out, drained and dried. Its constitution in the free state may be expressed by the formula:



For the process indicated other 2-acidyl-aminophenol derivatives substituted in the 4-position may be used; for instance, 4-methyl-2-formylaminophenol.

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

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## INDUSTRIAL INSURANCE

MANAGERS of textile plants all over the country are watching with considerable interest the work of rehabilitation of men and women injured in the industries that is being done at the Reconstruction Hospital, 100th Street and Central Park West, New York City. It has long been a problem vitally affecting industry in general to find some way of bringing a worker, after an accident in a mill, back to a condition where he can get back to his job quickly and with the least possible chance of permanent disability. The discoveries and training of war days in rapid re-education and rehabilitation have been made a part of the work at this hospital and, with an eye to the general benefit to industry, governmental agencies are urging the establishment of similar hospitals all over the country with the Reconstruction as a model.

Here is used every known kind of device, electrical, water and mechanical, for quickly bringing back to normal stiffened joints, partially paralyzed nerves and muscles out of control either from injury or disuse. A particularly interesting and valuable part of the cure is the use of what is called "occupational therapy" or the use of cheering and simple kinds of work to keep the mind of the patient from fretting and so retarding his recovery.

Any day one can see at the hospital men and women of all ages with little weaving looms on their knees working away with bright yarns at all sorts of things: bath rugs, baby blankets, table covers, scarfs, belts, tapestry, pillow tops and what not. The surgeons say that the physical effect of the relaxation and the constant repetition of similar movements has a soothing effect to some extent, but the real value is in that the patient has something besides four blank walls to look at; something waiting to be accomplished when he wakes up every morning; something to be proud of when finished, and, inasmuch as the hospital buys all he makes, something to create a little earning capacity as well.

The working of a little hand loom is anything but bur-

densome. It is creative and interesting. All sorts of textiles are used, and bright colors help to tone up the dulness of convalescence.

Men from every industrial State this side of the Mississippi are being sent to the Reconstruction Hospital after accidental injuries received in their industries, and are being put back on the job again in from one-third to one-half the time they would otherwise need. They travel sometimes long distances for this service, because they know that they will have at their disposal expert surgical and medical advice for diagnosis and treatment, every kind of helpful electric treatment that has ever been invented, the advantage of hot, cold and pressure water devices, some of them marvelous in their power to subdue pain and give soothing massage to deep-seated muscles, and a gymnasium of contrivances, each with its dial and pointer, that makes the re-education of a muscle, nerve or joint into a sort of a game, as well as assisting toward perfectly accurate diagnosis by the surgeons.

The Reconstruction Hospital has a staff especially trained in this sort of work and a corps of nurses that have added to their usual hospital training a vast amount of technical experience in the use of water, electricity, massage and mechanics to bring back lost powers and normal activity quickly and with the least possible pain.

There is in course of erection now a new eleven-story addition to the hospital, which will more than triple the hospital's capacity. With its erection, there will be space for special laboratories to study and a ward to care for men suffering from obscure diseases caused by industrial poisons of various sorts. There is at present no hospital specializing nationally in the study and care of industrial poison cases. With the taking over of more and more of the German dye industry in this country, it is believed that even the present urgent need will be materially increased. It is regarded as of particular importance to the manufacturers and dyers of fabrics that they have the service of such a hospital so as to detect the effects of poisoning in its early stages and prevent skilled workmen from being permanently disabled.

To workers in the textile industry this new movement for more hospitals specializing in the care of industrial injuries should have a peculiar appeal. It is the feeling generally that any instrumentality that prevents the worker from losing step in the onward moving procession of industrial life is something that benefits him not alone but also his trade and the industry in which he works.

## PLENTY OF "WORLDS TO CONQUER" FOR CHEMISTRY STUDENT

Dr. Bancroft Outlines Problems Awaiting Solution by  
Research Workers

"The student who wishes to take research work either in pure or applied chemistry can find innumerable problems in every field and of any degree of complexity and importance, from work that can be done by an undergraduate to work that no one sees how to do at present," says



Dr. Wilder D. Bancroft, War Memorial Professor of Chemistry, Cornell University, in a recent issue of the "Journal of Industrial and Engineering Chemistry."

It is quite generally admitted that future progress in invention lies in the field of chemistry, and Dr. Bancroft goes into some of the details concerning problems that await solution.

"If our present civilization is to pull through," he writes, "the scientific man must speed up production of crops and goods so that the masses of the people can live decently. While everybody will have to help in this, the bulk of the strain will come on the chemist and he must be prepared to meet it. We appreciate already the importance of nitrogen fixation and of getting potash from feldspar.

"The whole question of the better utilization of our petroleum resources is a vital one. Fortunately this has been realized by the oil producers and consumers, and Dr. Van H. Manning, formerly Director of the United States Bureau of Mines, has been appointed Director of Research of the American Petroleum Institute, which means that this work will be pushed as rapidly as possible. The American Institute of Baking is trying to improve the quality and keeping power of bread. The use of flotation processes has made it possible to work ore deposits which otherwise could not be handled profitably. The statement has been made that sixty million tons of ore are treated annually by these processes in the United States."

"While this is very gratifying, we apparently have no realization as yet of the possible future applications of these processes.

"When we consider ceramics, rubber and other plastics, paints, varnishes, leather, dyeing and printing, cellulose, cellulose nitrates and acetates, photography, etc., all subjects involving a large amount of colloid chemistry, we find that the industries concerned have a vast amount of empirical information as to what happens and know practically nothing about why it happens. The silicate industries are avowedly empirical, and so is the dyeing industry.

"The rubber industry knows practically nothing about the theory of vulcanization, to take a single illustration. So far as can be learned the people in the cellulose nitrate industry do not even know how many cellulose nitrates there are or what their real properties are. The photographic industry has only empirical knowledge in regard to emulsions and has no adequate theory in regard to photographic developers. The recent work of Dr. Wilson on quebracho and gambier and on the analysis of tannin, brings out clearly some of the important things which had been overlooked by the leather industry. All these industries will eventually be put on a sound scientific basis and this work will have to be done by chemists.

"The general position of the chemist is better since an appreciation of the importance of chemistry has been generally realized by the public. Some of the universities have already put their professors of chemistry on a special basis and the others will have to

follow suit if they hope to fill vacancies with good men. There used to be very few research fellowships for men who had received their doctor's degree, but now we have the National Research Council Fellowship in Physics and Chemistry, which are open only to applicants who have received the doctor's degree or its equivalent. Some of the universities have similar research fellowships. The du Pont Company is giving a number of unrestricted fellowships open to graduate students, and other companies are doing likewise, though not to such an extent."

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**NATIONAL ANILINE & CHEMICAL COMPANY  
MOVES TO NEW HOME MAY 15; AN-  
NOUNCES "KNIT GOODS MANUAL"  
DYER'S PERCENTAGE TABLES,  
AND MANY NEW COLORS**

Announcement has been made by the National Aniline & Chemical Company, Inc., to the effect that after May 15 the headquarters of this concern in New York City will be located at 40 Rector Street, instead of at 21 Burling Slip. This will provide the company with better facilities for handling its business than is at present the case, and the move will mean a more efficient service for consumers.

**DYER'S PERCENTAGE TABLES**

An extremely handy and useful device which is being issued as part of the company's service is a durable, acid-proof card containing the dyer's percentage tables which is designed to be hung in the dyehouse and to provide the practical dyer with a convenient method of converting percentages of dyestuffs into avoirdupois. The tables are divided into four columns, the percentage column reading from 10 per cent down to 0.01 per cent, and the corresponding avoirdupois columns are headed, respectively, 10 pounds, 50 pounds and 100 pounds. In this way a very extensive range can be secured; as, for instance, if 60 pounds of material is to be dyed with 1.69 per cent of color, the procedure would be as follows: In proper columns, find the percentages of color for 10 pounds and 50 pounds respectively in the 1 per cent column, and the sum of these would give the correct amount for 60 pounds of material to be dyed with 1 per cent of color. Then, find respectively the percentages of color for 10 and 50 pounds of material with 0.69 per cent of color; and the sum of these and the former quantity would give 1 pound 99 grams for 60 pounds of material to be dyed with 1.69 per cent of color. Other combinations may be calculated with equal facility, and the tables should prove a ready time-saver to the busy dyer.

**NATIONAL KNIT GOODS MANUAL, SECOND EDITION**

The company has recently issued a second revised edition of its "Manual of Hosiery and Knit Goods Dyeing." This little booklet has met with such general interest and approval that the first edition was very quickly exhausted.

The printing of a second edition afforded an opportunity of going over the subject matter thoroughly and of embodying certain improvements which seemed to be advisable.

The order in which the different phases of the subject are treated remains essentially the same as in the previous edition, and included in this are a number of dyeing processes of great importance to the hosiery dyer.

Stress is again laid on the fact that no attempt has been made to produce a comprehensive manual of dyeing, and the purpose has been simply to place in the hands of practical men definite information about "National" products which may be of service in the practice of modern hosiery dyehouses.

Special chapters are devoted to monotone shades, natural and artificial silk, mercerized cotton and also to heather effects and tricolette, and a final chapter is given on the very important subject of water in the dyehouse.

This booklet will be distributed upon application to the main office of the National Aniline & Chemical Company, Inc., at its new address, 40 Rector Street, or by any of the branch offices.

#### NEW NATIONAL DYES

The company has just added National Erie Scarlet B, National Erie Brown 3GN and National Erie Brown

3GN Conc. to its line of direct dyes.

National Erie Scarlet B is identical with the pre-war type Diamine Scarlet B. In addition to dyeing cotton, it is found valuable for the dyeing of union goods, as it produces reds of excellent fastness to rubbing and good fastness to water and washing on both wool and silk. This dye is also extensively used for the printing of wool and silk, for which purpose it is particularly adapted because of its brilliant shade and good fastness to light and water.

By virtue of its special properties National Erie Brown 3GN takes an important place in the National's extensive line of Direct Browns.

Its perfect solubility, even in calcareous water, recommends its use in mills having hard or variable water. This advantage, together with its level dyeing properties, makes it very useful for machine dyeing.

National Erie Brown 3GN has good affinity for vegetable fibers in a cold bath, and is especially recommended for all cases where the material suffers when dyed at the boil. It finds extensive use for the dyeing of artificial silk, linen, straw and paper, and is particularly recommended for the dyeing of unions, as it dyes silk and wool approximately the same shade as cotton.

The branch offices of the company will gladly furnish dyeings and product samples.

## New Dye Plants Organized in Italy

**Increasing Tendency to Avoid Specialization on Finished Products Is Shown—Heavy Rainfalls Relieve Shortage of Electric Power—German and Italian Delegates Meet to Overcome Trade Obstacles—Large Stocks of Reparation Colors Still on Hand**

By RAFFAELE SANSONE

Genoa, April 7.  
Special to The Reporter.

**L**ARGE quantities of war reparation dyes remained in the reserve stocks during the last five weeks, although the national demand for basic colors and colors for cotton dyeing was still very fair, owing to many cotton works operating on full time because of increased exportations. Special efforts were therefore made to increase the sale of such products abroad, and to take advantage of the increased value of the Italian lira—which increased value, however, was destined not to last long, owing to an early regain in the foreign exchange. This regain brought the value of the United States dollar from 18.50 lire to 19.50 lire, and the value of the English pound from 82.50 lire to 83.50 lire.

#### ORGANIZATION OF NEW DYE WORKS CONTINUES

Although the results obtained by the Italian coal-tar color works had not met the same success as was the case in some other branches of the Italian chemical industry, the creation of new firms continued, and

one of these, in Turin (Belotti e C.), has a capital of 1,700,000 lire. In this instance, however, a change in the old policy of placing all eggs in one basket is noted; for the new works, besides producing intermediates and coal-tar dyes, also produce chemicals, thus being in a position, if well directed, to make a dividend in one way or another.

The Societa Generale dei Colori, of Milan, having a capital of 5,000,000 lire, of which 2,500,000 lire is invested, has organized the sale of mineral colors and is studying the installation of an Italian works.

A meeting was arranged between Italian and German delegates for promoting arrangements to facilitate and encourage a greater exchange of products between the two countries. Although at the time of writing nothing decisive had been done, special studies were being made for the gradual elimination of the difficulties still existing in the commercial relations of these countries. It is believed that this can be accomplished because the principal Italian products are those of the soil, whereas Germany specializes, as usual, on dyestuffs, pharmaceutical products, chemicals, machinery, etc.



The Italian coloring matter works benefited during April by a more plentiful supply of electric power, which heavy rain and snow falls served to increase by augmenting the available water-power. In addition, cheaper coal and raw materials, produced by the lowering of foreign exchange of the past month, likewise aided the industry.

#### PRICES OF COAL-TAR DYES

The quotations of war reparation dyes in Table I, per ton in lire and dollars, shows the great difference

brought about by the lower United States exchange (19.50 lire) prevailing at the moment of writing, in comparison with the March prices.

#### MORDANTS, ASSISTANTS, DYEHOUSE PRODUCTS

The demand for mordants, assistants and other products was greatest on the part of cotton dye works, wool-treating concerns passing few orders through the unfavorable season. Some of the lire and dollar quotations are given, per ton at Milan, in Table II.

#### TABLE I

	Mar. 7 to Apr. 7 (lire)	March 7 (dollars)	April 7 (dollars)
Naphthol Yellow .....	50,000—70,000	2,702—3,783	2,563—3,589
Auramine .....	70,000—80,000	3,783—4,324	3,589—4,102
Orange II .....	30,000—35,000	1,621—1,891	1,537—1,794
Nigrosine, water soluble.....	30,000—40,000	1,621—2,162	1,537—2,051
Nigrosine, soluble in alcohol.....	35,000—40,000	1,891—2,162	1,794—2,051
Sulphur Black .....	7,000—10,000	378—540	359—512
Acid Black .....	35,000—40,000	1,891—2,162	1,794—2,051
Direct Black .....	35,000—40,000	1,891—2,162	1,794—2,051
Chrome Black .....	40,000—45,000	2,162—2,432	2,051—2,307
Methylene Blue .....	80,000—100,000	4,324—5,405	4,102—5,126
Direct Blue .....	25,000—30,000	1,351—1,621	1,281—1,537
Sulphur Blue .....	45,000—50,000	2,432—2,702	2,307—2,563
Malachite Green .....	80,000—100,000	4,324—5,405	4,102—5,126
Acid Green .....	60,000—70,000	3,243—3,783	3,076—3,589
Direct Green .....	50,000—70,000	2,702—3,783	2,563—3,589
Bismarck Brown .....	40,000—50,000	2,162—2,702	2,051—2,563
Magenta (Fuchsine) Crystals.....	70,000—80,000	3,783—4,324	3,589—4,102
Eosine .....	60,000—80,000	3,243—4,324	3,076—4,102
Ponceaux .....	35,000—45,000	1,891—2,432	1,794—2,302
Methyl Violet .....	70,000—80,000	3,783—4,324	3,589—4,102

#### TABLE II

	—April 7— (lire) (dollars)			—April 7— (lire) (dollars)	
Acetate of alumina.....	1,600	82	Bisulphite of soda, 32 deg. Be..	400	20
Chrome alum .....	3,000	153	Chlorate of potash.....	3,100	159
Bichromate of potash.....	6,000	307	Chloride of ammonia.....	5,000	256
Ferrous sulphate .....	500	25	Bleaching powder .....	900	46
Copper sulphate .....	2,250	115	Nitrite of soda.....	3,100	159
Tartar emetic .....	12,000	614	Yellow prussiate of potash....	13,000	666
Aniline oil .....	10,000	512	Yellow prussiate of soda.....	9,000	461
White refined glycerine.....	9,000	461	Caustic soda, 70/72.....	2,100	107
Glucose, 45 deg. Be.....	3,600	184	Silicate of soda, 140 deg. Tw...	1,000	51
Hydrogen peroxide .....	2,100	107	Sodium sulphide .....	2,600	133
Tannic acid, 60 per cent.....	20,000	1,024	Logwood extract .....	10,000	512
Tartaric acid, crystals.....	10,750	551	Yellow dextrine .....	3,500	179
Acetic acid, 30 per cent.....	2,800	143	White dextrine .....	3,800	195
Hydrochloric acid, 20-21 deg. Be.	300	15	Farina .....	3,250	161
Formic acid .....	11,000	564	Kordofan gum .....	4,900	251
Lactic acid, 80 per cent.....	4,000	205	Indigo, 25 per cent.....	22,000	1,128
Alum .....	1,000	51	Beta-naphthol .....	18,000	923
Ammonia, 22 deg. Be.....	1,450	74	Industrial castor oil.....	5,000	256

## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

D. R. O.—*Question:* We require dyes for cotton which will stand a weak chlorine bleach such as is given by laundries. Are there any colors except vat dyes and Turkey Red which may be used?

*Answer:* There is no other class of dyes we could recommend, as sulphur, direct and developed colors are all generally sensitive to a greater or lesser degree. There are two exceptions—Stilbene Yellows, which have been chlorinated in course of manufacture, and Primuline, diazotized and developed with hypochlorite. Of course, you may obtain some direct dyes which will resist for a short time, but a regular laundry bleach at frequent intervals will bleach them sooner or later.

A. C.—*Question:* How do dyers make up the "lime pots" they use for cleaning their hands?

*Answer:* A very satisfactory lime pot may be made by melting 10 pounds of sal-soda crystals in an iron pot by means of heat, without adding water. When it is just melted stir in 5 pounds of fresh bleaching lime. Continue stirring until every lump has disappeared and the mass is smooth and white. On cooling, it generally turns pink, due to the formation of sodium ferrate. The mass is used without water and rubbed well over the hands, but should not be used on the tender skin of the forearm. Then rinse off well with water. This leaves the skin feeling unpleasantly slippery and smelling of chlorine, with a great tendency to perspire. To remove these effects, wash again in bisulphite of soda, then in water, and the skin will be absolutely clean and also antiseptic. No bad effects will follow.

B. H. A.—*Question:* We have been using a sulphonated oil as a fat liquor for leather, but find that it strips colors made with acid dyes. We know of others using such oils with great success. Can you tell us what may be the cause of the trouble?

*Answer:* The only reason we can see for such behavior on the part of the fat liquor is that you are prob-

ably using a neutralized oil, which is actually a soap. When a sulphonated oil is used for fat-liquoring it should be the free acid oil without any added soda or ammonia. The free acid will make a milky emulsion in warm water, but the neutralized oil dissolves clear. You may test the product you are using and if it dissolves clear simply add a small quantity of any acid to free it from the alkali, and it will then make an emulsion which will not strip the colors.

E. T. M.—*Question:* How is methyl violet prepared so it may be ground in castor oil for the manufacture of copying typewriter ribbons?

*Answer:* Ordinary methyl violet will not grind well, but will always form hard gummy masses. The proper material to use is Crystal Violet 6B, which powders easily and does not gum. The grinding may be done in an ordinary paint mill.

J. S.—*Question:* What material is used to make the paint material known as Para toner?

*Answer:* Para toner is the trade name for the precipitate formed by the coupling of beta-naphthol with diazotized meta-nitroparatoluidine, also known as MNPT. No mineral base is used, the organic compound forming the entire product.

## CAMPBELL ISSUES BULLETINS ON WOOL BLACKS AND AUTOCHROME GREEN BB

John Campbell & Co., 75 Hudson Street, New York City, have issued two bulletins to the trade descriptive of a diversified range of Wool Blacks and Autochrome Green BB, and which contain dyed samples and methods of application.

The Wool Blacks described include the company's Aceko Black NBB and Aceko Black 10B High Conc., which types are blue blacks particularly well adapted for the printing of tapestry yarns, as Navy Blues for silk skeins and for shading Navy Blues on all-wool dress goods dyed in the piece, as well as wool hosiery and the production of blue blacks dyed in self-colors or shaded with Acid Red, Orange or Yellow; and are also widely used as a neutral dyeing color. Aceko Black 10B High Conc. is the purest in shade, and represents the highest possible concentration, a standard which should be appreciated by large consumers; while Aceko Black NBB is the normal strength, otherwise corresponding to the first-mentioned. Aceko Blue Black 15B High Conc., likewise described in this bulletin, represents the bluest shade as well as the highest possible concentration, and can be applied in sulphuric acid baths. Many dress goods manufacturers make use of this product as a basis for navies dyed on carbonized goods owing to its excellent leveling properties. It is also recommended for goods difficult to penetrate, and for carpet wools, unions, silk dyeing, fur felt hats, etc.



Autochrome Green BB is a new Campbell product which will be found serviceable as a chromate color, also for vigoureux printing, as well as chrome bottom and top chrome methods. Autochrome Green BB is likewise valuable as a direct dyeing acid color and for neutral dyeing. This product possesses good fastness to light, especially in medium or deep shade, and satisfactory fastness to fulling when dyed in the presence of chrome or when after-treated; also to stoving, carbonizing, cross-dyeing and alkalies. Cotton and artificial silk threads are practically unstained. Silk is dyed to same depth as wool. Tests for fastness should be determined in each individual case. Autochrome Green BB can be used in metal dyeing machines (Franklin) without material alteration of shade.

The company likewise calls attention at this time to a new Acid Scarlet which it is manufacturing and introducing under the designation of Aceko Scarlet RRG.

Aceko Scarlet RRG is a product used by carpet mills for printing as well as for dyeing. It produces very level results, giving good body and brilliancy, and can be used in strong acid baths. This particular brand gives excellent yellow shades of scarlet with good fastness.

Aceko Brilliant Scarlet is another type of scarlet similar to Scarlet 3R and 4R, giving beautiful blue shades of scarlet. It is recommended for the dyeing of carpet yarns. It can also be used to blend Aceko Scarlet RRG.

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#### **RODNEY HUNT MACHINE CO. TO EXHIBIT AT KNITTING ARTS SHOW**

The Rodney Hunt Machine Company, of Orange, Mass., will be represented at the forthcoming Knit Goods Exhibition in booths 269 and 270, the display being in charge of its Philadelphia representative, the R. C. Jefferson Company. Co-operating with the Jefferson organization, the factory textile engineers will be present to answer all questions and will assist in explaining the various features of Rodney Hunt machines.

In addition to the Philadelphia representation, the company now is represented in Chicago by R. R. Street & Co., Inc., 28 North Clinton Street; in Charlotte, N. C., by H. G. Mayer, Realty Building, and in Canada by W. J. Westaway & Co., Ltd. A. W. Buhlmann, 200 Fifth Avenue, New York City, is the foreign representative of this long-established company.

The "Rodney Hunt" line of wet finishing machines, including fulling mills, washers, reel machines (for dyeing, bleaching and scouring), warp dyeing machines, etc., is being marketed throughout the country as highly developed products. Attractive catalogues are available for any mill.

"Rodney Hunt" service wood rolls are being used very successfully by an increasing number of mills, and with facilities for manufacturing all sizes and types of rolls, from the very smallest to the largest, this branch of the business has been growing rapidly during the past year or two. Rodney Hunt rolls are used not only in all branches of the textile industry but also in paper mills.

#### **DU PONT ANNOUNCES PONTACHROME BLACK F, PONTACHROME VIOLET SW, AND MILLING SCARLET O**

Recent announcements of the Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., from the New York City sales office at 8 Thomas Street, include descriptions of Pontachrome Black F, Pontachrome Violet SW, and a Milling Scarlet as colors now being marketed.

Pontachrome Black F is a chrome black in which consumers will find a color that has very excellent qualities and which is adaptable for producing deep jet blacks for a special use in the men's wear trade, where its fastness properties will meet all the usual requirements. Fine grays are obtained by the use of this product in light dyeings which are easily applied by the chromate method.

Pontachrome Violet SW is a color which will work by either the top, bottom or chromate methods. It also is especially adaptable to the men's wear trade, and also has the property of leaving both cotton and silk effect threads unstained. It is a very level dyeing product and extremely adaptable for combination shades.

The Milling Scarlet being offered by the company is marketed under the name of Du Pont Milling Scarlet O, and is a product which is characterized by brilliancy of shade and especially recommended for knitting yarns, flannels, blankets, etc. This color can be treated with chrome, and the shade becomes slightly bluer; but it will be much faster to milling and to light.

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#### **SEYDEL-NITRO MERGER**

Formal announcement is made under date of May 1, 1922, by the Seydel Manufacturing Company, of Jersey City, and the Nitro Products Corporation, of Nitro, W. Va., that these two concerns have become merged under the name of the Seydel Chemical Company. The plants at both points mentioned will be enlarged and will concentrate on the production of "Seydel Chemicals." A metropolitan office will be maintained at 120 Broadway, New York City. The officers of the new company are: Herman Seydel, president; Paul Seydel, vice-president, and J. B. Pitcher, secretary-treasurer.

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

MAY 22, 1922

NUMBER 11



## "National" Dyes and the Knitting Arts Exposition Philadelphia, May 22-26

THE National Aniline & Chemical Company, Inc., will have an exhibit at this Exposition and the most recent developments in the art of dyeing hosiery, underwear, bathing suits, sweaters, etc., will be shown to the best advantage.

Members of the "National's" technical staff will be in attendance to welcome our

friends in the trade. All are cordially invited to visit our exhibit.

As this is the outstanding event of the knit goods year, and serves to mark the progress in the production of knitted articles and in methods of manufacture, the May number of \*"DYESTUFFS" will be specially devoted to knit goods.

*\*"DYESTUFFS" is a monthly magazine issued by the "National"—a digest of interesting and informative articles appearing in various domestic and foreign trade journals, of interest to the users of dyestuffs.*

**National Aniline and Chemical Company, Inc.**

New York   Chicago   Charlotte   Toronto   Philadelphia  
Boston   Hartford   Montreal   Providence   San Francisco





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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

VOLUME X

NEW YORK, MAY 22, 1922

NUMBER 11

## The Job Dyehouse

Location—Building and Power Plant—Equipment: For Piece-Goods Dyeing; Hosiery; Raw Stock; Drying; Water Softening—Operation: Scouring—Piece Goods; Bleaching; Dyeing; Finishing

By A. T. BRAINERD  
*H. A. Metz & Co., Chicago, Ill.*

CONSIDERABLE interest has lately been manifested regarding the industry known as job dyeing, and information has been sought concerning its possibilities. A brief outline of the requirements and experience essential to operation of the business may be of some enlightenment to those contemplating entering this field, as well as a statement of fact to those who are customers of the job dyer, calling their attention to the broad scope of the business which serves them. It is hoped that some points mentioned may be of interest to the smaller job dyer himself. His variety of work produced is so great that perhaps he has not given sufficient consideration to some important subjects. Such an outline can contain no details of arrangement of equipment or expense of installation. These must necessarily depend on the available or projected building and the desired production.

### LOCATION

The location should be desirable as regards accessibility for labor, from the standpoint of both employer and employee. Labor must be available and must have transportation to and from the plant. A railroad siding is of great advantage, if car-lots are to be handled, and haulage cost must be considered if trucking is necessary. A low-rent neighborhood is required so far as this combines with other necessary qualifications. There must be an abundant supply of water as free from minerals as possible.

### BUILDING AND POWER PLANT

Space is required for dyeing machinery, drying, storage, shipping, office, laboratory and boilers. One of the chief considerations in building or remodeling should be ventilation of the dyehouse. Ventilating equipment should

be installed which will insure entire freedom from steam, at least to a point 7 or 8 feet above the floor.

The boiler capacity must be sufficient for steam required for all machines and drying equipment, plus a margin for overloading or speeding up and for increasing production. Steam for heating must be taken into consideration if the distances carried are great enough to cause loss through condensation in piping. Less than 100 pounds of steam pressure should not be considered sufficient boiler capacity for a plant of four or five dyeing machines and a corresponding number of tubs and driers.

The power transmission must be properly planned. It is generally recognized that motor-driven machinery is economical and advantageous.

### EQUIPMENT

*Yarn.*—Two types of yarn-dyeing machines are in general use. The Hussong (circulating type) and Klauder-Weldon or Giles (rotary type) are most largely used for skein dyeing. There is a difference of opinion among dyers as to which is superior. Both are entirely satisfactory. The circulating machine doubtless has more points in its favor. The volume of dye liquor is smaller, which effects a saving in dyestuffs in many cases; the yarn is rather tightly packed in the machine, and consequently the danger of felting is remote; contrary to some opinions, there is practically no danger of tangled skeins. Many dyers, however, prefer open machines, probably because they want to see their shades while "coming up." Some insist that the material, especially woolen and worsted yarn, needs action of the air in dyeing—a rather improbable contention. Confidence being a large factor in successful work, a man is likely to produce best results using equipment with which he is familiar and in which he places his trust.





*Interior of a Modern Yarn Dyehouse—That of the Franklin Process Company at Providence, R. I.*

A sufficient supply of hand tubs should be available to take care of all small lots and of special jobs where the use of a machine might cause complications, as in mordanting of yarn with sumac where contact with iron would have a detrimental effect.

Scouring machines are almost a necessity. Many dye-houses have never used them, but they are now recognized as proper equipment for worsted yarn as well as woolen. The latter is almost always scoured in chains, in a machine; while worsted yarn, if containing only an easily saponifiable wool oil, may be successfully scoured in either type of dyeing machine. When handling in Hussongs, one machine of the battery is reserved for scouring, and rinsing is done in the same machine in which the yarn is to be dyed. This system is economical, as the scouring bath is retained while the yarn is run over the track to the desired machine for dyeing.

Vats are required for bleaching cotton yarn. These are now usually built of smooth-finished concrete, and arranged in a group in one end of the plant, where chloride of lime or fumes are not likely to come in contact with material being dyed. A sulphur house is necessary for economical worsted-yarn bleaching. This must be outside of the dyehouse.

**Piece-Goods Dyeing.**—The ordinary piece dye kettle, such as is used for flannels, etc., is proper for all woolen, worsted or union dress goods, linings, etc., which are likely to come to the job dyer. Equipment for this work ought to consist of at least two kettles, one for light and one for dark shades. If space is available an additional large-size machine will prove economical so that big lots of one color may be dyed in quantities. A tenter frame and press are essential for finishing piece goods, and the

investment for such machinery will amount to a considerable sum of money.

Cotton piece dyeing requires jigs and pads, and the equipment should include a continuous machine if sulphur color work is to be done. A frame is necessary, also drying cans with stretcher, starch box, etc. It can readily be seen that piece dyeing and finishing equipment requires so large an investment that the smaller dyehouse will do well to confine its activities to other materials. The large finishing plants in this country are so well equipped for handling piece dyeing business, especially in cottons, that the smaller converter would doubtless find discouraging competition.

**Hosiery Dyeing.**—A considerable amount of hosiery dyeing business has been available during the past few years, in spite of the fact that most of the large manufacturers operate their own dyehouses. Quite large quantities can be handled with proper machinery and, due to the comparatively high value of material, especially silk hosiery, good prices can be obtained for dyeing.

Rotary-type machines are in general use for both boiling off and dyeing. The ordinary laundry machine operated at slow speed can be successfully used. For sulphur blacks a basket machine, or rotary machine with pumping apparatus to remove and store the dye liquor, is most satisfactory. Considerable space, as well as proper steam pressure, is necessary for drying forms if any amount of hosiery dyeing is to be done.

**Raw-Stock Dyeing.**—Circulating type, preferably basket, machines are considered most desirable for any class of raw-stock dyeing, chiefly on account of time and labor saving in operation. Dyed shades are more uniform and level than can be produced in tubs unless much attention



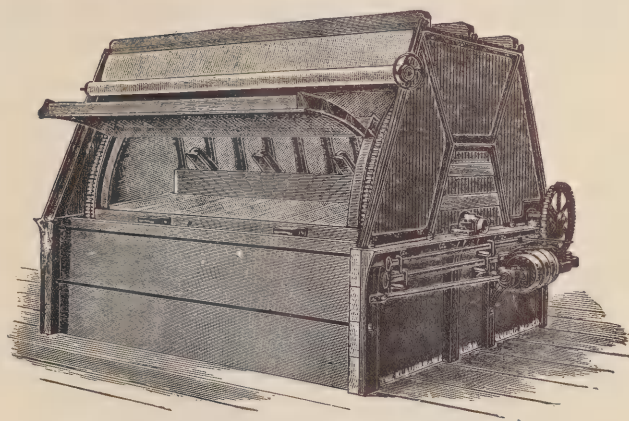
is given during the dyeing operation. Rotary-type machines are largely used for loose wool and are found satisfactory in every way except in speed of production. They are more adaptable for lots smaller than machine capacity and, as is true of all open machines, sample taking is easier. Rotary machines have another advantage in that satisfactory results can be obtained with some dyestuffs that are not thoroughly soluble enough to produce successful results in the circulating machines.

*Drying Equipment.*—The drying capacity must be sufficient to take care of production, with a safe margin for overloading. Nothing is more detrimental to the morale of a dyehouse than shutting down machines to await catching up in the drying or packing. It is true that drying yarn or stock may proceed night and day, but in case of a rush of business, dyeing machinery may be operated twenty-four hours a day, so the maximum drying capacity should equal the greatest amount that can be turned out of the dyehouse. Many satisfactory yarn driers are on the market, but a built-in dryer is probably the most economical. Circulation of air is the foremost factor, being much more important than heat in producing rapid drying. A built-in dryer, partitioned in the center with powerful fans circulating heated air, has been found to produce excellent results with any skein material. Revolving reel driers are largely used and give satisfactory service. When loaded with damp yarn and in motion they develop a terrific centrifugal force, so must be of sturdy construction. Practically no steam is used when reel drying, but considerable additional power is necessary.

Raw stock is usually dried on wire-bottomed, built-in trays set in a gable position, so that circulation of warm air within the surrounding frame effects the maximum drying surface. Considerable time is necessary for drying raw cotton on account of the compact mass it forms when wet.

*Water-Softening Plant.*—Unless the dyehouse is most fortunately situated where there is an abundant supply

of soft water, a softening plant is almost a necessity. Many manufacturers and dyers were loath to make the initial investment required when the softening devices were first put upon the market, but repeated demonstrations in practice have proven so conclusively the value and saving of water softening that the advantage is no

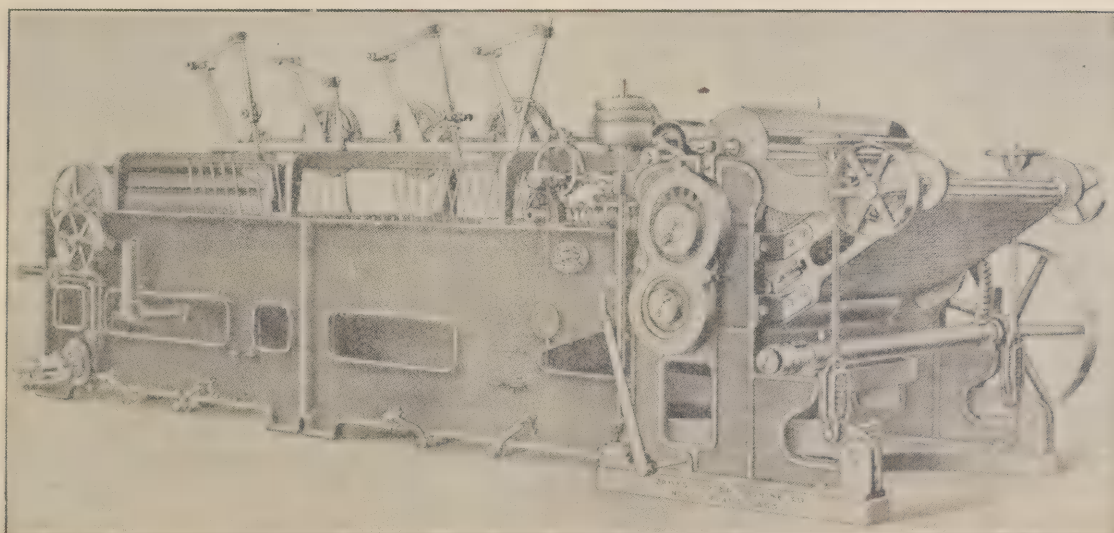


*Klauder-Weldon Dyeing Machine for Loose Stock*

longer questioned. The manufacturers of water-softening equipment have abundant proof that they can save the cost of their plants in soap bills alone in remarkably short periods of time. There is undoubtedly saving in dyestuffs in many cases, and the efficiency of production and lack of redyeing due to faulty scouring is a revelation.

*Miscellaneous.*—Besides the above-mentioned machinery and equipment, there are numerous other necessary items. These include hydroextractors sufficient in number to take care of maximum production, motors for machines and fans, motor truck, dyehouse trucks, balers, scales, measuring clocks for piece goods, dye sticks, horses, pails, sieves, piping, belting, tools, laboratory equipment, office equipment, drug room, etc.

*Materials.*—A final important item to be considered in respect to the original investment is supplies of materials.



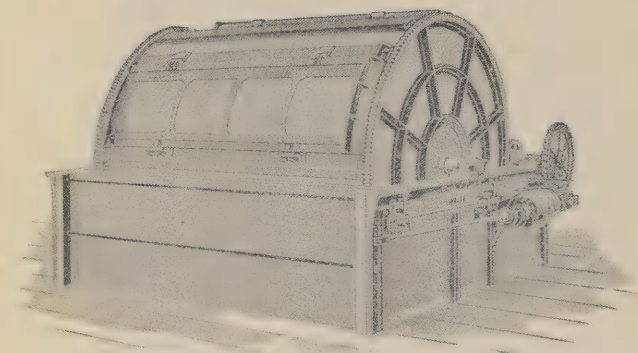
*Scouring Machine—James Hunter Machine Company*



While it has become a national custom to purchase stocks on a hand-to-mouth basis, nevertheless a dyer must always have at his immediate disposal an adequate supply of coal, soap, dyestuffs and chemicals. The number and quantity of dyestuffs always on hand will depend on the variety of work produced and the business at hand. Falling markets must be watched, but fair quantities

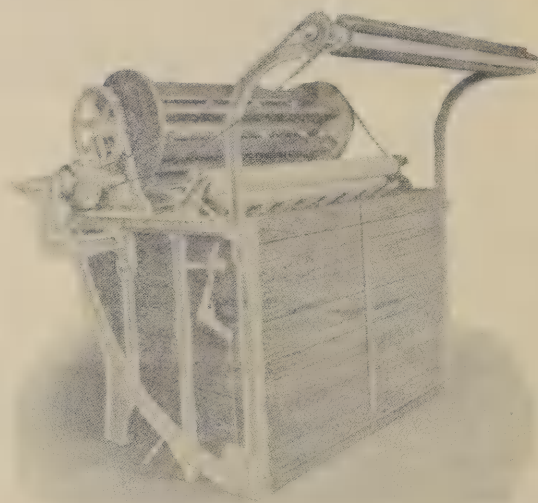
## OPERATION

*Scouring.*—So far as yarns are concerned, especially woolen and worsted, the preliminary operation—viz., scouring—is by far the most important. Many dyers are expert colorists, but they have neglected to study thoroughly the scouring process. It is the job dyer's biggest problem, because he does not know the stocks or wool oil used in the manufacture of the yarns that come to him. He has only the smell and feel of the yarn and his past experience on which to base his judgment of the proper scouring method. Closely watching the first batches of unfamiliar stocks and keeping records of shrinkages, uneven dyeings, etc., will supply facts for future use. Undoubtedly 90 per cent of woolen and worsted yarn dyeing troubles are due to imperfect scouring or failure to remove all traces of soap before entering the yarn in the acid dye bath. Yarn from practically every manufacturer will require a somewhat different treatment in

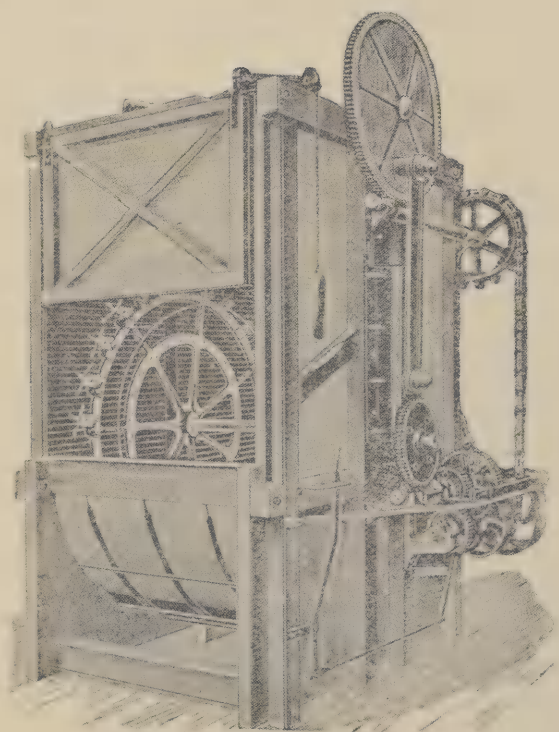


*Klauder-Weldon Dyeing Machine with Top Removed to Show Cylinder*

must be purchased in order to obtain the best available prices and terms. It is always well to bear in mind that cash on hand is an important item in this, as in any business. Sound financial standing is of as much benefit when soliciting business as when seeking credit.



*Rodney-Hunt Piece Dyeing Machine*



*Klauder-Weldon Silk Skein Dyeing Machine, Showing Dye-Wheel in Working Position*

scouring. The amounts of soap and soda, the time and the temperature may all vary with different yarns. Excesses should be avoided, of course, as yarn is easily felted, yellowed and made harsh from too vigorous scouring. A small addition of ammonia to the last rinse is of assistance in removing the last traces of soap. There is only one definite rule for scouring, which is: *The yarn must be clean.* Subsequent operations will not fail to show any infraction of that rule.

*Piece Goods.*—The scouring of woolen and worsted piece goods is of equal importance, but is not likely to be of particular interest to the job dyer, as most material of this class which he receives is for redyeing. Unless the goods are very dirty, a thorough wetting in hot water will usually suffice. Cotton piece goods (gray goods) present a problem which the job dyer, as referred to in this article, will be happy to avoid. Unless equipped with kiers and high-speed drying and finishing machinery, he

cannot handle dyeing or bleaching of fine cotton goods. The cheaper job of dyeing cotton drills where removal of moles or bleaching is not necessary can be handled on pads or jigs by wetting out in caustic or diastofor before dyeing.

**Bleaching.**—Yarn properly prepared can be bleached satisfactorily and very little trouble encountered if definite established methods are followed. Cotton yarn must be thoroughly and completely boiled out, preferably in a kier, before bleaching is attempted. The chloride of lime bleach is practically universally used for cotton yarn or piece goods. Definite methods of procedure are given in many available books, but a bleacher, probably more than any other finisher of cottons, must have practical knowledge on which to work.

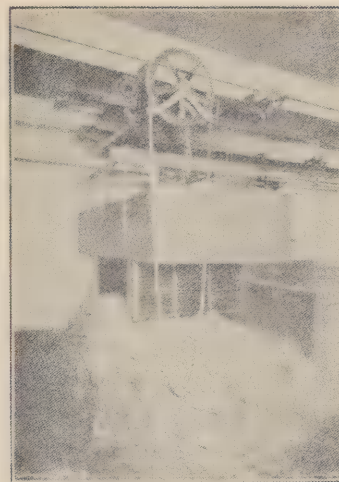
Sulphur bleaching for worsted yarns and peroxide for silk and cotton hosiery are generally established methods. Information regarding the practice of both of these is readily available.

**Dyeing.**—Woolen and worsted yarns form a considerable part of the job dyer's business. A large number of spinners do not operate dyehouses, and consequently their customers, principally sweater manufacturers, buy yarn in the oil and sent it to the dyer with orders for colors as needed.

Acid colors chiefly are used for this class of work. They are of sufficient fastness for all ordinary requirements and possess the brilliancy of shade desired. Level dyeing and fastness to rubbing qualities, together with reasonable precaution for light fastness, are the chief concern of the dyer. Practically all acid colors work in combination with each other, though care is necessary in

entirely suitable for adding to the boiling bath where shading is necessary.

Long boiling of acid colors is most advisable, especially in rotary-type machines. Uniformity and solidity of shade are much more satisfactory if dyeings are allowed full time. Formulas should be so developed that it is not necessary to sample every few minutes and pull the plug the instant the shade is correct.



*Cage of Hussong Machine Discharging Batch of Raw Stock*

Other things being equal, cost of dyestuffs should, of course, decide what products are used. The dyer is entitled to know, however, just what he is getting when he changes to a cheaper color. Therefore the reliability of a salesman and the firm he represents may be a deciding factor in the adoption of one of several competing dyestuffs.

Cotton yarn is practically always dyed with direct colors, the exceptions being basic colors for brilliant shades and vat, sulphur or developed colors for extreme fastness. Most direct colors are level dyeing, though it is advisable to have specialties on hand for mode shades, light grays, etc. Fastness requirements are not usually exacting, and present available dyestuffs give the dyer a considerable choice of suitable materials. Direct colors suitable for after-treatment to enhance fastness to washing are now available. These, with developed blacks, make possible the production of a fairly complete range of the better class of direct colors. When using circulating machines, standing baths should be kept and, whenever possible, yarn dyed without boiling out, except that it should be boiled a few minutes in the old dye liquor before the additional dyestuff and salt are added.

Basic colors are used for brilliancy only, and whenever possible they should be dyed on a sumac extract mordant rather than topped over a direct color. Brighter shades are obtained and a more stable color lake formed with the tannin antimony mordant. In topping, where this is resorted to on account of lower cost of manipulating, high temperatures must be avoided. When mordanting



*Battery of Rodney-Hunt Dyeing Machines*

choosing combinations of approximately complementary colors. In mixing orange and blue or blue-green, for example, dyestuffs which exhaust together should be used in order to avoid mottled effects. Advantages in cost of dyestuffs will be obtained if certain of the cheaper dyestuffs which are perfectly level dyeing in full shades are used when suitable, and others, usually more expensive, kept for shading or for use in formulas calling for light percentages. Many of the acid colors now available are



with tannic acid, great care must be exercised, else uneven results will be obtained in spite of all precautions in dyeing.

Sulphur and vat color dyeing requires wooden tubs with iron fittings. Dye baths must be carefully prepared and kept in proper condition. The yarn should be kept below the surface of the dye liquor as much as possible to avoid uneven oxidation.

Artificial silk, being largely used at present, must be given consideration. It offers no particularly difficult problem in dyeing, provided the stock in each batch is the same. However, two different yarns will be dyed distinctly different shades in the same dye bath. Direct colors are used for dyeing artificial silk, and should be chosen according to their level dyeing properties. The attraction of this fiber for dyestuff is very great, hence baths are rapidly exhausted. It is advisable to keep the temperature below 190 deg. Fahr., as the strength of the fiber is seriously impaired while in a boiling bath. The natural strength returns on cooling and drying, but serious breakage may occur if care is not taken during the dyeing operation.

The acid and direct colors used for yarn dyeing will suffice for all ordinary requirements for piece goods. Neutral dyeing or union colors are also largely used on dress goods, due to low cost and simplicity of application. Most redyeing being in dark shades, the union colors are of satisfactory brilliancy and by their use speck dyeing is avoided.

Hosiery dyeing requires sulphur black for most of the all-cotton material that will come to the job dyer. Direct colors, perhaps after-treated, are used for colors on all-cotton, as well as for silk-and-cotton, hosiery. For the latter special color combinations must be worked out. In general, it can be said that foundation colors which dye cotton and silk alike in one bath should be used, and an adequate supply of dyestuffs for shading either fiber in a neutral salt bath should be kept on hand. Many other combinations of yarns, such as wool and cotton, wool and silk, wool and artificial silk, are now used for hosiery. Formulas must be worked out according to results desired. These often call for various two-tone effects.

Developed black is now almost universally used for solid black on silk and cotton hosiery. The apparatus for dyeing should include a pump and tank for storing dye liquor so this may be saved while the diazotizing and developing are being carried on in the dyeing machine.

Loose wool is almost always dyed with chrome colors, in order to produce a shade of sufficient fastness to withstand subsequent operations in manufacture. The top-chrome or metachrome process is generally used. The latter method is of advantage on account of saving in time and admits of easier shading, but it is not entirely satisfactory as regards fastness when heavy shades are dyed. The chrome mordant, two-bath method is recognized as producing the fastest results, and dyeing to sample is easier than by the top-chrome method. Bottom-

chrome dyeing, however, requires additional time and considerable more labor, unless machines are used.

Raw-cotton dyeing that will come to the job dyer will most likely be sulphur black. This should, of course, be handled in a circulating, preferably vacuum-type, machine. The dye liquor must be forced through the material under great pressure to insure penetration to all parts of the batch. The sulphur black liquor must be kept properly dissolved and of correct density by means of frequent testing with the hydrometer.

*Finishing.*—As suggested above, the job dyer will do well to avoid taking in material that requires any great amount of finishing machinery. In fact, piece-goods converting does not concern the job dyer except as a separate department in a large plant. The finishing of yarns and stock consists only in drying, conditioning and packing, and the only requisites are proper facilities for expeditious handling.

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### AMERICAN DYE PLANT TO PRODUCE CARBAZOL

The Thatcher Process Company, Syracuse, N. Y., organized two years ago to produce anthraquinone, the principal basis for a long line of alizarin dyes previously produced at a profit on a commercial basis only in Germany, is to quadruple its capacity and add to its output a new product, carbazol, not hitherto manufactured in this country. New capital to the amount of \$150,000 will be sought.

Carbazol as produced in other countries is gray. The product made here is white and 99.5 per cent pure. Both dye bases are produced here electro-chemically.

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### NATIONAL AT THE KNITTING ARTS EXPOSITION

At the Eighteenth Annual Knitting Arts Exposition, being held in Exposition Hall of the Commercial Museum, Philadelphia, the National Aniline & Chemical Company, Inc., will occupy spaces 89, 90 and 91, where the company will have on display a varied assortment of knitting yarns and knitted fabrics of all kinds, representing the last word in the application of dyes manufactured by this company to that class of material.

Members of the technical and sales staff of the company will be present to welcome and greet all those interested in the latest developments of the use of color as applied to knitted fabrics.

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The Empire Fuel Company, Dallas, Texas, is planning for the construction of a by-product dye and chemical works in connection with a new lignite briquette plant at Rockdale, Texas. Adam H. Davidson is chairman of the board and treasurer.

# Abstracts of A. C. S. Dye Division Papers, Spring Meeting

**F**OLLOWING are abstracts of papers delivered before the Dye Division of the American Chemical Society at the Spring meeting of that organization, held this time in Birmingham.

Before starting the papers, the Secretary of the Division, R. Norris Shreve, enumerated a few of the activities in which the officers of the Division had been engaged since the last meeting. In accordance with the resolution of the Division at the Rochester Meeting in the spring of 1921, the Secretary of Commerce was petitioned to supply the information on individual dye marks that had been elided from the Norton Census of Dyes because of the protest of the importers of German dyes. In accordance with this resolution the Bureau of Foreign and Domestic Commerce prepared a supplement to the Norton Census, giving this desired information. These supplements have been distributed to all registered members of the Division and also to other interested parties.

The Secretary of the Division has also been co-operating with the Society of Dyers and Colourists of Bradford, England, in the preparation of the Color Index. The Co-operation Committee of the Division had one meeting in the early winter with the Color Laboratory in Washington and the report of this visit was made to the Division.

Several men were prevented from attending and their papers were read by title. Dr. Max Phillips of the Color Laboratory in Washington read a paper by himself on "The Preparation of 7, 7'-Di(-hydroxyisopropyl)-indigo," and he also presented a paper by H. L. Haller of the same laboratory on "The Preparation of Phenylglycine-o-carboxylic Acid. I—From Anthranilic Acid and Monochloroacetic Acid." Dr. E. Emmet Reid of Johns Hopkins spoke about some work which he and Mr. Waldron had been doing on azo dyes containing sulphur. Dr. Reid exhibited samples of dyeings showing that when sulphur was in a position directly bound to the benzene ring its influence was to deepen and redden the shade of azo dyes. Dr. M. T. Bogert described work which he and Dr. Meyer had done on "Experiments with Dehydrothio-p-toluidine and Related Compounds." Dr. Bogert announced that quite recently he had prevailed upon Columbia University to relieve him of all his work except that pertaining to dyes, intermediates, and related compounds. Dr. Jules Bebie described a number of uses for the saccharin by-product, p-toluenesulphonyl chloride. "The Analysis of B-Naphthylamine" by a number of different methods was described by Messrs. Henry R. Lee and D. O. Jones.

## THE PREPARATION OF PHENYLGLYCINE-O-CARBOXYLIC ACID FROM ANTHRANILIC ACID AND MONOCHLOROACETIC ACID

*By Herbert L. Haller*

A study of the preparation of phenylglycine-o-carboxylic acid from anthranilic acid and monochloroacetic acid has been undertaken. Optimum conditions have been determined for (1) concentration in water of the reacting substances, (2) time allowed for reaction, (3) ratio of reacting materials, (4) condensing agent, and (5) temperature of reaction mixture.

## THE INFLUENCE OF SULPHUR ON COLORS OF AZO DYES

*By W. R. Waldron and E. Emmet Reid*

Some thirty different bases containing sulphur in a variety of positions and associated with various alkyl and aryl radicals have been prepared, diazotized, and coupled with representative dye intermediates to form dyes so as to show the influence of sulphur groups in various positions on the color. Bases having sulphur in the sulphide and sulphone condition have been compared with the sulphur-free bases and it has been found that the sulphide sulphur is bathochromic while the sulphone group is usually hypsochromic.

## EXPERIMENTS WITH DEHYDROTHIO-P-TOLUIDINE

*By Marston I. Bogert and Martin Meyer*

When dehydrothio-p-toluidine is subjected to the Skraup reaction, it yields the corresponding benzothiazolyl quinoline. The Atophan reaction was unsuccessful. Attempts to prepare dehydrothio-p-toluidine by fusion of nitro-toluene or p-nitrobenzal-p-toluidine with sulphur gave very poor yields of the product sought. 2-p-toluy-benzothiazole was prepared by the Jacobsen method from thio-p-tolanilide and some of its derivatives investigated.

## USES OF P-TOLUENESULPHONYL CHLORIDE IN THE MANUFACTURE OF DYES AND INTERMEDIATES

*By J. Bebie*

p-Toluenesulphonyl Chloride is a by-product in the manufacture of saccharin. A great amount of chemical work has been devoted to the utilization of this material and one of its derivatives, Chloramine-T, is generally known as an excellent germicide. Other derivatives have found application in the dye industry. The p-Toluenesulphonyl Chloride itself can be used in various ways in the manufacture of dyes and inter-



mediates, particularly as a component or a part of a component for the production of various classes of azo dyes and in the combination with azo dyes containing hydroxyl groups with the purpose of making the resulting dyes fast for alkali and soap.

#### THE APPLICATION OF THE DIRECT DYES IN COLORING PAPER

*By Walter C. Holmes*

The customary trade practice for sized papers is ineffective owing to the formation of considerable proportions of aluminium lakes of undesirable characteristics. Maximum tinctorial strength and brilliance are conditioned, in general, upon insuring maximum color absorption in the form of dye and the retention of the residual color in the form of the calcium, or other suitable lakes. With ground wood furnishes, complete color retention in the latter form is advisable.

A considerable range of attractive shades of superior fastness to light may be obtained by a judicious employment of the copper lakes of various individual dyes and dye combinations.

#### ON THE PREPARATION OF 7:7 DI-(ALPHA-HYDROXY-ISOPROPYL) INDIGO

*By Max Phillips*

Starting with para-cymene obtained from "sulphite turpentine" and using a modified procedure of the Heumann phenylglycine-o-carboxylic acid synthesis of indigo, a new indigoid dye has been prepared. The method used consists in first nitrating para-cymene, then oxidizing the nitro cymene to o-nitro-p-hydroxy-isopropyl-benzoic acid; reducing this to o-amino-p-hydroxy-isopropyl-benzoic acid; condensing the latter with monochloroacetic acid to hydroxy-isopropyl-phenylglycine-o-carboxylic acid and finally fusing with potassium hydroxide.

This new dye has a similar absorption spectrum to that of indigo and has quite similar dyeing properties.

#### THE ANALYSIS OF BETA-NAPHTHYLAMINE

*By Henry R. Lee and D. O. Jones*

Methods are presented for the analysis of Beta-naphthylamine in the presence of its common impurities, namely: beta-naphthol, alpha-naphthylamine and B-B-Dinaphthylamine.

By sulphonation of beta-naphthylamine the nitrite titration can be applied in the presence of beta-naphthol

A separation of beta-naphthylamine from beta-naphthol and B-B-Dinaphthylamine is made by precipitation of the former as the hydrochloride from benzene solution. The hydrochloride is dissolved in water and titrated with N/2 nitrite at 32 to 40 deg. Fahr. The benzene solution is evaporated to dryness and the

beta-naphthol determined by titration with diazo-p-nitro-benzene.

The Kjeldahl Gunning method has been modified by sulphonation of the sample with 25 per cent oleum in the cold and the use of a glass wool plug in the neck of the flask during digestion.

Beta-naphthylamine, alpha-naphthylamine, beta-naphthol and B-B-naphthylamine were prepared in the pure state and some of their physical constants determined.

Melting point curves are given for beta-naphthylamine with each of these impurities up to 10 per cent.

#### FUNCTION OF ASSISTANTS USED IN COTTON DYEING

*By Andrew J. Leddy*

##### *Directs and Sulphurs*

A. The Direct Dyes.—They are usually applied to cotton from an alkaline bath containing a sodium salt. The alkali rectifies the hardness of the water, softens the material and causes better penetration. The sodium salt is used to decrease the solubility of the dye-stuff by increasing the number of sodium ions.

B. The Sulphur Dyes.—The sulphur dyes are applied to cotton from a bath containing an alkali sodium sulphide and a sodium salt. The sodium sulphide is used to dissolve the dye which is insoluble in water. The excess alkali probably aids the solubility. The main functions of the alkali and sodium salt are the same as with the directs.

##### *Basics and Vats*

A. Basics.—The basics have no affinity for cotton. The cotton must first be treated with a weakly acid mordant, usually tannin. The tannin is subsequently rendered insoluble by treatment with a soluble antimony or iron salt. The dyestuff combines with the mordant to form an insoluble compound.

B. Vats.—The vat colors are insoluble in their natural state but are capable of reduction to a leuco compound. They are usually applied to the fiber from a bath containing sodium hydrosulphite and an alkali. The hydro reduces the dye. The alkali aids in keeping the reduced dye in solution and never should be omitted.

#### NEW LABORATORY FOR TUFTS

The construction of a new chemical laboratory at Tufts College, College Hill, Mass., which, when completed, will be one of the finest and most modern buildings of this type in the United States, has been authorized by the trustees. The laboratory will be erected on Tufts Field and face on Talbot Avenue. The architects are Edward H. Rockwell and Edwin H. Wright. The department of chemistry at Tufts is in charge of Prof. Frank W. Durkee.

The new structure will be 60 feet in height, of four stories, including the basement, or ground floor, and will measure on the ground 166 by 78 feet.

# Notes on Dyeing Wool and Worsted Pieces

Importance of Full Information for the Dyer—Fulling as a Cause of Cloudedness—Losses from Mineral Soaps—Zeolite Rectification—Carbonizing Before Dyeing—Yellowing of Silk and Cotton  
Resists—Chrome Mordants—Green vs. Yellow Mordants—Assistants—  
Single Bath Chrome Methods — After-Chrome Methods —  
Acid Colors—Making Sure of Good Solutions—  
Hints on the Dyeing Operation

By JOSEPH A. KNOX

**T**HE problems of the dyehouse do not begin with the delivery of the already fulled gray goods to the dyer; they begin back in the mixing room where the various qualities of wool are laid down and sprinkled with oil emulsion, preparatory to carding. There is not so much difference between any natural wool and noils, but when there is introduced lime fulled wool, sulphide wool, alumina carbonized wool and stripped shoddy, the fiber mixture which goes to make up the yarn is almost as sure to give a mixed or mottled effect in dyeing as a mixture of cotton, silk and artificial silk. There is no general rule which will help the dyer in handling such a mixture; certain dyes seem to produce more level effects than others, just as some cover kemps better than others; but this quality is separate and distinct from what is generally known as the level dyeing quality. When such a mixture of wools is present it is very desirable that the dyer should know it, so he can take precautions and possibly have the colors he intends to use tested out on the goods in the laboratory. If this is not done beforehand, the final result will look more like a stock mixing than a piece dye. Every dyer is familiar with the stripes that run across the goods when a stray bobbin of filling from another mixing has been shot in by mistake and sometimes the color is seen to change from light to dark, right in the middle of a piece, where the weaver started on to a new lot of filling.

## DYER SHOULD BE INFORMED

Such faults cannot be corrected, but they are mentioned to impress on others that they are not to be blamed on the dyehouse—the dyer must be kept in mind from the time the fabric is designed until it is sold. Dyeing and chemistry have accomplished wonders, but they cannot accomplish miracles.

The spinning emulsion needs much attention—we admit that many mills are able to use mixtures containing mineral oils and save some money at that point. We suggest that they make a calculation as to the amount this saving is offset by later expenses and troubles in scouring and redyeing. The proper lubricant for wool is conceded to be red oil; this may be emulsified with water and soda ash and later its full equivalent in soap may be omitted, or even a greater

quantity, as a little extra soda in the fulling soap will convert it all into an efficient scouring medium and still give cleaner goods than where mineral oil was used. A further advantage is to add some sulphonated oil, which promotes its emulsifying properties to a high degree.

## FULLING AS A CAUSE OF CLOUDINESS

Fulling may also be responsible for clouded pieces. Most fullers use a very alkaline soap and, as the goods are run in rope form, it is easy to see how certain parts may be unduly subjected to the heat, alkali and mechanical action, and differ in physical nature from the parts that have not received the full severity of the treatment. Differences, even slight, in the density of the felting and in the amount of raised surface fiber, will always show as clouded effects on the finished piece.

As the soap must be washed out of the fulled goods and as the scouring must be done afterward or, at least, rinsing until free from soap, we had better consider the water supply.

## LOSSES FROM MINERAL SOAPS

Most people are familiar with the formation of lime soap; it is the curdy deposit we notice collecting around the sides of a bathtub soon after soap has been put into the water. In some districts it is much worse than others, but there is hardly a part of this country where it does not exist to some extent.

If it were only the loss of soap caused by the lime it would not be so serious, although the yearly loss in any mill is an amount that would cause much anxiety if it were fully realized. The mineral soaps—lime, magnesia, alumina and iron—are all waxy masses that are insoluble in water and which adhere to the goods in small lumps. Heat melts them and they waterproof and resist the fiber against dyeing for a time.

Gradually the acid of the dye bath decomposes them and the dyeing proceeds, but later the finished piece shows light spots that seem to be without any reason for existing, as the material which caused the trouble has vanished.



## ZEOLITE RECTIFICATION IN PRACTICE

Many up-to-date dyeing establishments have water purification systems using zeolite masses; these plants have water troubles also, generally because they regenerate the mass on stated days rather than by a rule based on the amount of water used. Whenever the mass becomes exhausted the troubles reappear, but this is the strongest kind of an argument in favor of such a system—when rightly used.

Where such purification systems are not available the addition of sodium phosphate or sodium fluoride to the water, even immediately before use, will cause the mineral matters to form insoluble phosphates or fluorides and prevent them from uniting with the fat acids of the soap. Piece dyers often run the goods for twenty minutes in hot water containing a little ammonia, as a precaution, immediately before dyeing, to remove any traces of soap that may not have been rinsed out in the regular operation.

The soap question next demands attention. In former years it was believed that the heavy body of tallow soap was necessary to get the best results, but unfortunately it is also the most difficult to rinse out of the goods. Soda soaps are harder and less soluble than potash soaps. Stearic acid soaps are harder and less soluble than oleic acid soaps, which practically means that soaps from vegetable oils are more soluble than those from animal fats.

## PALMITIC ACID SOAPS, REAL AND FICTITIOUS

However, there is a class of soaps which meets the requirements of being heavy bodied, raising a dense lather, and still being of very good solubility; these are from palmitic acid, supplied by cocoanut and palm oils. Soaps made from palm or cocoanut oils lather in hard water and also in salt water; hence they are not likely to form curds of lime soap in cases where the water is not pure.

Many mills are now using palm soap in their fulling with great success, but many troubles also result from the purchase of fictitious palm soaps from irresponsible dealers, who sell tallow soaps colored in imitation of palm oil.

## CARBONIZING BEFORE DYEING

Some manufacturers carbonize before dyeing, more carbonize afterward, and a few speck-dye. It is difficult to dye level on carbonized cloth, and it is also a good rule not to dry the goods after scouring but to run them at once into the dye bath. Goods containing alkaline soap undergo some changes on the edges of folds exposed to the air and clouds will later appear on the finished pieces that may be hard to explain. There should be no long delays between fulling and dyeing, but if there are, or if the material has been dried, a run in hot water and ammonia in the piece-dye

machine is the best preliminary treatment. Carbonizing before dyeing is done with sulphuric acid but carbonizing after dyeing may be done either with acid or by the aluminium chloride process. It would introduce many difficulties if the alumina method were used before dyeing. Acid carbonizing requires a complete neutralization with soda, as water alone will not remove the acid, it being chemically combined with the wool; the wool is what the dyer calls "sourred." After neutralization a good rinse is also advisable for, while the acid of the dye bath would again neutralize any excess of soda, it would produce an uncertain condition and we would never be sure just how much acid was available to work the dye.

## YELLOWING OF SILK AND COTTON RESISTS

We must now go back to the construction of the goods. Often pieces contain threads of white or colored silk or cotton, which are to be left undyed. That is not all; they must be able to stand the fulling and perhaps carbonizing. White silk may be resisted if acid dyes only are to be used, but if bichromate is used, either in the single-bath method or after-chrome, it will be noticed that the chrome has oxidized the tannin of the resist and produced a dull yellow. White silk effects with chrome colors may be had with pure unresisted silk, but it should be remembered that all the resisted colors are also made yellower from the same cause and if they suffer in brightness it is not the dyer's fault. Various vat dyes on the silk will go through the necessary operations without being resisted, only it is important that the dyer choose dyes for the piece dyeing that do not stain silk.

## CHROME MORDANTS

For dyeing the goods there is a choice of several methods according to the requirements. The first is the chrome mordant, which is used with wood colors, alizarines and galloxyaniline or other gallic acid derivatives. Chrome mordants differ not only in the amount of chromium they deposit on the fibers but also in the ratio of chromic acid to chromium oxide—that is, in their oxidizing power. The more chromic acid present, the yellower the mordant; the more chromium oxide, the greener the mordant. Each has its purpose and an excellent dye may be ruined by a badly adjusted mordant.

As an example let us consider logwood extract. Part of this is hematine, or fully oxidized coloring matter, and the remainder is hematoxylon or unoxidized material. If we dyed on a green mordant that had been thoroughly reduced we would obtain only a pale blue from the union of the hematine with the chromium oxide. The bath would not be exhausted and most of the dye would be lost. On the other hand, by dyeing logwood on a yellow mordant the hematine unites directly with whatever chromium oxide is present while

the chromic acid slowly oxidizes the hematoxylon to hematine, which then dyes as before.

#### GREEN VS. YELLOW MORDANTS

Now if we use a yellow mordant for the dyeing of certain soluble alizarines or gallocyanine, the free chromic acid at once acts on the bisulphite which is used to make the dye soluble. The mordant is reduced rapidly to the green condition but the dye is spoiled; it has lost its solubility and remains suspended in the liquor, and if it colors the fiber it is only by a loose attachment that allows it to wash and rub off at the first opportunity. Further, the dyes related to gallocyanine are actually destroyed by free chromic acid, and only yield their brightest shades when dyed on a green mordant.

Dyes similar to the chromotropes, which require oxidation, would yield only indefinite shades on a green mordant, although they can only be used in light shades, even on the yellow, being strictly after-chroming colors.

#### CHROME ASSISTANTS

The degree of reduction of the mordant depends, of course, on the quantity of chrome assistant used, as well as the quality. Tartar is a slow, old reliable, generally used when a yellow bottom is wanted, but for better reduction we have lactic, formic and oxalic acids and sodium bisulphite. Sometimes only bichromate and sulphuric acid are used, giving hardly any reduction and that only such as may be caused by the wool itself.

After a chrome mordant, *never* dry the goods before dyeing, as it is almost impossible to rewet them so they will dye level.

The use of a chrome mordant is not as popular today as it was formerly, although colors of the highest possible fastness to all influences are to be obtained by the use of the alizarines and other mordant dyes. Dyeing on chrome mordant also has the advantage of giving a sample that indicates correctly the final shade of the goods, and makes accurate matching possible.

#### SINGLE BATH CHROME METHODS

Closely following the chrome mordant method, we have the single bath chrome process. This has several variations. The simplest uses bichromate in the dye bath with the dye and later acetic acid is added. The metachrome process utilizes a mixed mordant consisting of bichromate and ammonium sulphate, which furnishes the necessary acid by decomposition on boiling. Still another process uses a neutral chromium salt which with acetic acid, mordants wool fibers with a non-oxidizing mordant and permits the use of dyes that would be destroyed by bichromates.

The advantages of the single bath processes are that the development of the shade may be followed by sampling, the color goes on slowly and evenly and is more easily controlled in light shades, and lastly that a large number of dyes are available that will leave unresisted silk white by this process. The disadvantage, which is also true of the after-chrome process, is that the dyer may have added some colors for the final matching of the shade and some of the chrome may not have been entirely reduced, so that, when the cloth reaches the spongers, and is steamed, in a roll, there is a further reaction between dye and mordant and curious color changes take place. Many a dyer has been blamed for shaded pieces, which had passed inspection once, but which were altered by the work of the spongers after the goods had been sold.

The remedy for this is a final boil for fifteen minutes with some formic acid, which completes the reduction of the free chromic acid and prevents further changes.

#### AFTER-CHROME METHODS

The last class of chrome dyes are those that develop their color and fastness by after-chroming. It is always necessary to dye them slowly and evenly and to exhaust the dye bath before chroming. Acetic acid will work almost all of them at about the proper speed. Glauber's salt retards the dyeing, favors penetration and leveling, but also retards the exhaust and consequently the clearing of silk effects. For this reason, when there are unresisted silk effects, it is often recommended to omit the Glauber's salt.

The normal after-chrome dye will develop its full tone in less than a half hour with 2 per cent of bichromate. There are a few blacks that are made dull and rusty if more than 1 per cent of chrome is used and there are some reds, of the carmoisine class, which require 4 to 5 per cent of chrome and two hours' boiling to change them to good blues. Such products can only be used on material that is not likely to suffer from long working.

#### THE SULPHON CYANINES AND ACID COLORS

The next class of dyes is that of the acid colors, but as an intermediate class we may consider the sulphon cyanines. These are used for navy blues and blacks but have been the cause of much trouble wherever they have been used as neutral or acid dyes. While they are not strictly chrome colors, it has been found that they work much better when half their weight of bichromate is put into the dye bath. Even when dyed with the greatest care, either neutral or acid, the finished goods would invariably show light and dark clouds. It is claimed that the wool itself exerts a reducing action on the dye and that the presence of bichromate prevents this action, rather than acting as a mordant.



## TWO GENERAL CLASSES OF ACID COLORS

The acid dyes may be divided into two classes—the fast-to-light level dyeing colors and the ordinary acid dyes. The first class includes Alizarine Sapphirol Fast Light Yellows, Crystal Orange, Alizarine Rubinol and a number of azo reds as well as others of the alizarine series. Most of these leave silk effects white and are used on goods for men's wear, fancy shades, light tones and wherever level dyeing and fastness to light are the main requirements. Some goods for women's wear have equally rigid requirements but the others are simply full bright shades that may be dyed with the average acid dye.

Another point that arises, before the dyeing is commenced, is whether to run in the pieces direct from the truck or to "bag" them, i. e. sew the selvages together with the face of the goods inside. The only valid reason for doing this is in the case of material that shows a tendency to curl into a tight roll on the edges. When this occurs even the best leveling and penetrating dyes will fail to dye the edges as heavy as the middle of the piece. With goods that do not curl there is no need for this precaution. As to the advisability of running goods open instead of in a rope it may be said that as several successful dyers are dyeing tricotines in navy with sulphon cyanines, running in rope, without bagging, it would seem that there is no necessity for running open, except perhaps in the case of mohair plushes. Excessive working in the dye bath may result in permanent wrinkles, but if the goods are dyed in the usual time there is little to fear. Even yarn or loose wool would suffer from too much handling and the same must be counted as one of the hazards of piece dyeing.

## OBTAINING GOOD DYE SOLUTIONS

Dissolving dyestuff seems such a trivial matter that sometimes it does not receive the attention it deserves. No dye should be added to the dye bath that is not in perfect solution. There is only one satisfactory method, and it should be followed with dyes of all classes. Stir the dry color with cold water until all lumps are broken up and all the dyestuff has been thoroughly wet. Then add boiling water in sufficient amount to effect solution; this is better than boiling the dye solution because most soluble alizarines and gallocyanines are decomposed by boiling.

Additions of dye to a set of running pieces should always be made through the color box or by a pipe extending under the false bottom of the machine. If the added dye is not especially level dyeing, the bath must be cooled first; but in any case, shut off the steam for five minutes when adding any color whatever.

## BEGINNING THE DYEING OPERATION

In starting the dyeing it is better to add the color,

Glauber's salt and part of the acid and slowly raise the temperature. Before a boil is reached the remainder of the acid may be fed on slowly. Good results may be had by adding all of the acid at first and also by omitting it at first and feeding it on later. Every dyer has his own method, but the heavier shades are easier to control than delicate tones, so it must not be inferred that the method used for a seal brown is the proper one for a pearl gray.

The goods, having been dyed to shade, may show that the silk effects are not clear. Generally more acid and chrome will clear the whites, but if not we may add from eight ounces to two pounds of hydrosulphite, first cooling to 140 deg. Fahr., and running about ten minutes. As soon as the silk is clear, run off the liquor and start washing.

## FINAL PRECAUTIONS

Every dyer knows that cold water run on hot goods has a tendency to set the wrinkles, so the washing is done as the hot liquor runs off. The final caution is that it should be remembered that the baskets of most hydro-extractors or whizzers are made of bronze and many dyes are reddened by copper, so that they show spots where the goods come in contact with the metal. A piece of sheeting to line the basket will prevent this, but it must be washed frequently or our sheeting itself will act as a carrier of copper and cause more stains than the bare basket.

If we bring the goods this far without any faults, they may safely be sent to the finisher and if the percher sends for the dyer later on to complain we trust he will be able to uphold his end of the argument by the help of the few points just given.

## AZO DYES FROM CONIFEROUS RESINS

In British Patent 173,254, of July 22, 1920, R. Arnot describes the manner in which resins obtained from coniferae, when treated with fuming nitric acid, are nitrated and oxidized from hydroaromatic to aromatic compounds. The nitro-compounds formed are readily reduced to amines which yield azo dyes when diazotized and coupled with suitable components. Alternatively, abietic acid may be sulphonated and the product coupled with diazonium compounds to form azo dyes. The distillation of colophony with lime yields a phenolic oil, which on nitration and reduction is converted into amines suitable for the preparation of azo dyes. The preparation of a number of azo dyes of a variety of shades is described.—F. M. R., through "Jour. Soc. Dyers & Colourists."

A recent dispatch from London states that a Manchester firm of dyers has announced a process for dyeing more than one shade at a single dipping. The process is said to depend on the selecting absorption of dyes by fabrics made from mixed fibers.

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

### *President*

LOUIS A. OLNEY  
Lowell Textile School, Lowell, Mass.

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WALTER M. SCOTT	

## SEVENTH COUNCIL MEETING

The seventh Council Meeting of the American Association of Textile Chemists and Colorists was held at the Engineer's Club, Boston, Mass., on Friday, May 12, 1922.

The following members were in attendance: L. A. Olney, William D. Livermore, William H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee and W. E. Hadley.

The following members were admitted into the Association, by vote of the Council:

### *Active Membership*

Alpers, George H., 122 Hudson Street, New York City.  
Colorist, H. A. Metz & Co.

Archer, B. K., 330 North Sixth Street, Camden, N. J.  
Salesman and Demonstrator.

Hayes, George A., P. O. Box 1069, Riverpoint, R. I.  
Bleacher, Dyer, Finisher, Phenix Lace Mills.

Kenney, James E., 84 School Street, Charlestown, Mass.  
Colorist, United Indigo & Chemical Company.

Lane, M. J., 220 Allyn Terrace, Lawrence, Mass.  
Demonstrator, John Campbell & Co.

Lorimer, Walter H., Ontario and Lawrence Streets, Philadelphia, Pa.  
Textile Chemist.

Purcell, James, 147 Main Street, Southbridge, Mass.  
Chemist, Southbridge Printing Company.

Wall, William J., Nicetown Dye Works, Westmoreland  
and C Streets, Philadelphia, Pa.  
President, Nicetown Dye Works.

### *Junior Membership*

Beasley, D. D., 38 South Avenue, Wappinger's Falls,  
N. Y.

Chemist, Dutchess Bleachery.

Lawton, H. F., 19 Grove Street, Pawtucket, R. I.  
Bleach House, Second Hand, U. S. Finishing Co.

Purris, George I., 130 Oliver Street, Boston, Mass.  
Colorist, H. A. Metz & Co.

Russell, William W., 651 Warren Avenue, East Providence, R. I.

Textile Chemist, Sayles Finishing Plants.

Steele, E. V., 3 Elm Place, Marblehead, Mass.  
Student, Lowell Textile School.

Washburn, J. M., 66 Pine Street, Lowell, Mass.

Demonstrator, National Aniline & Chemical Co.

Respectfully submitted,

W. E. HADLEY, Secretary.

## SIXTH RESEARCH COMMITTEE MEETING

The sixth meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held in the Engineer's Club, Boston, Mass., Friday afternoon, May 12, 1922.

The following members were in attendance: L. A. Olney, William D. Livermore, William H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee, William R. Moorhouse, W. J. Murray and W. E. Hadley.

The complete outline of the paper prepared on "Fastness of Dyed Silk to Washing, Scouring and Fulling" was discussed by the Research Committee, same having been prepared by the Special Committee in charge of Dr. W. M. Scott. This paper, in accordance with the general procedure, is to be published in full, as a provisional method, and after same has been subjected to criticism, and any needed alterations, will be considered as standard for this type of work.

The report of the special subcommittee on "Fastness of Cotton Material to Scouring and Washing" in charge of George A. Moran reported progress, and the method will be published in the near future.



## Provisional Method on Fastness of Dyed Silk to Washing, Scouring and Fulling

The following revised provisional method on "Fastness of Dyed Silk to Washing, Scouring and Fulling" is published by Walter M. Scott, Chairman of the Subcommittee of the Research Committee which was appointed for this purpose.

In submitting this report the Research Committee wishes it definitely understood that it is provisional and is open for suggestions or discussions on the part of the members of the Association, or any others who may be especially interested.

This method will not be adopted as an official method until sufficient time has elapsed to give everyone an opportunity to make any criticisms or suggestions that may be necessary for its improvement, and with this in mind the Research Committee specially invites such comment.

### WASHING TESTS

#### *Directions for Testing*

*On Skeins.*—Take about a five-inch length of the dyed silk skein, divide it in three parts, and add to each part an equal amount of undyed silk, wool and cotton, respectively, then weave into a braid. Heat the soap solution to the designated temperature, then immerse the braid for two minutes. Remove the braid from the solution, pass it through a wringer, and then return to the soap solution again. Repeat this process until there have been five immersions in the soap of two minutes each, followed by a passage through the wringer. At the end, rinse the braid in cold water, extract and dry. Note staining of wool, cotton or white silk, also loss in shade of the dyed silk.

*On Pieces*—For this test use a piece about four inches square and duplicate the procedure described above. If so desired, the colored piece may be wrapped around a piece of plain white silk. Note change in shade and also staining of the adjacent white fabric, if it is present.

#### *Specifications for Solution and Temperature*

Test No. 1—Soap Solution (1%) at boil.  
 Test No. 2—Soap Solution (1%) at 160° F. (70° C.).  
 Test No. 3—Soap Solution (1%) at 120° F. (50° C.).  
 Test No. 4—Soap Solution (1%) at 85° F. (30° C.).  
 Test No. 5—Equal volumes of Soap Solution (1%) and Salt Solution (1%) at 85° F.

The soap used is the best grade of neutral tallow chip, such as Lux or Ivory flakes.

### FULLING TEST

Similar to that given for wool.

Take 2½ grams of the dyed yarn and braid it with smaller amounts of white silk, cotton and wool in such a way that the dyed silk makes good contact with the three undyed fibers. The weight of the dyed silk must be at least equal to the combined weight of the undyed material.

The solution for the test contains 5 grams of white neutral soap and 2 grams of Soda Ash per liter. Soak the braided sample in 150 c.c. of the above solution for sixteen hours at room temperature. Then heat in water bath to 140 deg. Fahr. (60 deg. Cent.). Remove from the bath and mill briskly on a scrubbing board until the wool is thoroughly felted. Rinse, dry and unravel for examination. The test so made compares fairly well with a two-hour mill fulling.

### CLASSIFICATION OF COLORS

Note.—In listing the standards for each group, the original name and Schultz number are given wherever possible. [Those colors which are made in this country of satisfactory quality and quantity are indicated by a star.]

*Class 1*—Colors fast to test No. 1 without change in shade. Cotton, wool and silk are unstained.

Standards—Vat Dye.

\*2% Indigo MLB4B Powder No. 881.

Sulphur Dye.

\*5% Immedial Indogene GCL.

Chrome Dye.

2% Erio Chrome Azurol B No. 551—after chromed.

\*Aniline Black—oxidation of aniline hydrochloride.

Note.—Logwood black when properly dyed on an iron mordant shows no change of shade in test No. 1, but is not included among the standards because it stains cotton appreciably and silk slightly.

*Class 2*—Colors fast to test No. 2 without change in shade. Wool is unstained; cotton and silk slightly.

Standards—\*10% Primuline No. 616—developed with beta-naphthol.

\*12% Zambesi Black V—developed with meta-toluylene diamine.

*Class 3*—Colors fast to test No. 3 without change in shade. Cotton and silk slightly stained; wool even less.

Standards—Dyed with acetic acid.

\*1% Victoria Blue B No. 559.

\*1% Brilliant Green Crystals No. 499.

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*Class 4*—Colors fast to test No. 4 without change in shade. Wool is unstained; cotton and silk slightly.

Standards— Dyed with sulphuric acid and boil-off liquor.  
 \*2% Formyl Violet S4B No. 530.  
 \*2% Patent Blue A No. 545.  
 Dyed with Glauber's Salt and Acetic Acid.  
 \*2% Diamine Green B No. 474.  
 2% Diamine Fast Blue FFB.  
 \*2% Chrysophenine G No. 304.

*Class 5*—Colors fast to test No. 5 without change in shade. Wool is slightly stained; cotton and silk a greater degree.

Standards—Dyed with sulphuric acid either with or without boil-off liquor.  
 \*2% Fast Red A No. 161.  
 \*2% Patent Blue V No. 543.

*Class 6*—Colors which change shade even in test No. 5 and stain cotton, wool and silk to a large degree.

Standards— Dyed with Sulphuric Acid.  
 \*5% Indigotine No. 877.  
 \*2% Acid Magenta No. 524.  
 \*2% Alizarine Sapphirole B No. 858.  
 \*2% Orange II No. 145.

*Washing*—For practical purposes, the colors in the first four classes are perfectly acceptable in solid shades when the washing directions of the Laundry Owners' National Association for silk are followed. They may be washed with similar success in the home by following the instructions given in connection with Lux or Ivory Soap flakes.

Classes 1 and 2 are particularly satisfactory for use on embroidery silks and all types of colored silk stripes used in connection with a white ground which are liable to be subjected to a more severe washing.

Solid color fabrics dyed with Class 5 colors may be washed at room temperature if extreme care is used. A small percentage of common salt in the solution will help to hold the color.

Class 6 colors are only suitable for goods where no washing is expected. Fabrics dyed with these colors must be dry cleaned.

*Fulling* (see foot-note) \*Class 1—Colors in this group are fast to four or more hours' ordinary fulling without noticeable change in shade or staining of cotton, wool and silk.

Class 2—Colors in this group are fast to two or more hours' ordinary fulling without noticeable change in shade. Wool is unstained; cotton and silk slightly.

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\*The Committee is indebted to Mr. Livermore, of the American Woolen Company, for practical fulling tests, as a result of which the above classifications were arrived at.

Class 3—Colors in this group will stand two hours' fulling with only very slight loss in shade and staining of wool, silk and cotton.

Class 4—Colors in this group show a more noticeable loss in shade in the course of two hours' fulling and stain cotton and silk in varying degrees. Wool is, however, either unstained or very slightly so.

Classes 5 and 6—The colors in these two groups are unsuitable for use where the dyed silk is expected to undergo any fulling operation.

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### CHANGES OF ADDRESS

The following changes and corrections in names and addresses of members should be noted:

WILLIAM H. CADY,  
 127 Power Street,  
 Providence, R. I.

WALTER F. HAMLIN, JR.,  
 128 South Front Street,  
 Philadelphia, Pa.

L. N. HOOD,  
 159 High Street,  
 South Manchester, Conn.

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### NOTICE FROM THE SECRETARY

*Applications for Membership in the American Association of Textile Chemists and Colorists*

All individuals who believe they are eligible for membership in the Association and are desirous of affiliating with the organization can communicate with the Secretary, who will gladly furnish application blanks and extend to them every possible assistance.

It is desirable that members of the Association should make an effort to interest all those who they believe would make desirable members.

The Secretary will at all times be pleased to provide members with as many application blanks as may be desired.

W. E. HADLEY, Secretary,  
 5 Mountain Avenue, Maplewood, N. J.

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### ELECTROMETRIC TITRATION as a MEANS OF DETERMINING THE FREE SODIUM SULPHIDE IN A SULPHUR BLACK DYE BATH

By W. WALKER RUSSELL  
 with SAMUEL T. ARNOLD  
 (Continued from last issue.)

Iodine, however, has the disadvantage that it must be used either in acid, or in neutral solution, and acid results in the precipitation of the dye, as well as the liberation of the sulphide ion as hydrogen sulphide.



Preliminary experiments showed that the dye may be precipitated from solution in a more or less reduced condition, by acid, and this precipitate is subject to oxidation by the iodine reagent. It is this side reaction, between the dyestuff and the iodine, which necessitates the precipitation of the dye in Len's method, and the distillation of evolved hydrogen sulphide in the method of Swann. To eliminate or to control this side reaction proved to be the main problem in the work.

From the first a serious difficulty was involved in obtaining like samples for use in duplicate titrations. The sulphur dye bath, especially, in the freshly reduced condition, is oxidized only too readily by any contact with the air, and unless especial precautions are taken, this fact alone will prevent any sort of check titrations. There is no special difficulty involved in the volumetric estimation of the sulphide alone by means of iodine,<sup>6</sup> but with a sulphur dye dissolved in the sulphide, determination of the sulphide ion is increasingly difficult.

The following titrations serve to show the ease with which a sulphur dye bath oxidizes when freshly reduced. The dyestuff was freed from any sulphide it may originally have contained by treatment with acetic acid which was neutralized before making up the bath with a given amount of sodium sulphide. The volumetric flasks containing the dye baths were kept tightly stoppered, and the dye baths were exposed to the outside air only during the removal of the sample with a pipette.

## BATH A

No.	Date	Sample	Amount of N/10 Iodine	Grams of $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$
1	May 19	15 cc.	15.47 cc.	0.1858
2	May 21	15 cc.	14.62 cc.	0.1756
3	May 21	15 cc.	12.74 cc.	0.1529
4	May 24	15 cc.	8.38 cc.	0.1006

## BATH B

5	May 21	15 cc.	14.44 cc.	0.1734
6	May 24	15 cc.	13.50 cc.	0.1621
7	May 24	15 cc.	12.49 cc.	0.1499
8	May 24	15 cc.	11.03 cc.	0.1324

*Note*—The above results represent in each group the successive titrations of a single bath, when on the same day the titrations were spaced about one hour apart. Comparisons of numbers 2 and 3 of Bath A, and of 6, 7 and 8 of Bath B, show clearly the error introduced by the sampling of the same bath with only ordinary precautions. This sensitiveness of the freshly reduced dye bath to oxidation makes it necessary, at this stage, to avoid all operations, such as precipitating the dyestuff from solution, filtering it off, or of in any way exposing it to the air.

<sup>6</sup> M. Tschilikin, *Anal. Chem.*, 48:456.

There are two factors to be considered in determining the amount of iodine which takes part in the side reaction, with the precipitated dyestuff, as already referred to. First, the amount of acidified standard iodine solution to which a given amount of dye bath is added, and second, the time which is allowed for the two to interact. In the following titrations the same amount of dye bath was added to differing amounts of standard iodine solution. The determinations were carried out in sets of two, the samples being removed in rapid succession and immediately added to an excess of acidified iodine. In each case the second sample stood in contact with the iodine while the first was being titrated.

		Excess of Acidified N/10 Iodine to Which Sample Was Added	CC. of N/10 Iodine Required
1	15 cc.	20 cc.	12.57 cc.
	15 cc.	25 cc.	13.20 cc.
2	15 cc.	25 cc.	16.42 cc.
	15 cc.	20 cc.	16.07 cc.
3	15 cc.	29 cc.	16.24 cc.
	15 cc.	20 cc.	15.52 cc.
4	15 cc.	28 cc.	20.86 cc.
	15 cc.	20 cc.	18.23 cc.

It was, at last, decided to control rather than try to eliminate the oxidation of the precipitated dye, by allowing the iodine to react only for a given time, and then adding an excess of standard thiosulphate, the idea being that sufficient time be given for the iodine to react with the free sulphide present, but not enough allowed for the iodine to attack the dyestuff itself to any appreciable extent. The method which was finally worked out makes use of this scheme, and is given fully, as its success, if duplicate check determinations are desired, depends on attention to details, especially in the case of a newly reduced bath.

A sufficient quantity of the dye bath to be analyzed is best obtained in a stoppered bottle from which smaller samples may be taken. The procedure for two samples is as follows:

To each of two liter beakers containing about 700 cc. of water and 10 cc. of 1 to 3 hydrochloric acid add about 70 cc. of N/10 iodine<sup>7</sup> from a 100-cc. burette. Stir thoroughly to mix the acid and iodine. Two 50cc. pipettes, each topped with a short piece of rubber tubing containing a solid glass bead, are used to remove the samples. By means of the tubing and the beads the pipettes can stand full of liquid. Each pipette is filled from the bottle as rapidly as possible, the liquid being drawn well up above the mark.

<sup>7</sup> Iodine in excess of the amount actually required by the sulphide must be added here.

(To be concluded.)

# Extraction of Oils and Soap from Thrown Silk

Effects of Solvents upon the Unsoaked Raw Silk—Effect on Soaked Silk—Extent of Extraction of Oil and Soap—Losses of Silk Substance Otherwise Unaccounted for—the Time Factor  
Important—Care in Sampling

By H. S. MUDGE

IT is very important for all persons concerned to know whether analyses reported as "oil extract" or "ether extract"—ordinarily identical terms—represent the true percentage of material on the silk, due to the soaking operation.

Whatever the method of soaking used, whether merely oil spraying, soaking in an emulsion of soap and oil, the use of sulphonated oils, or any operation in which a fatty oil, and occasionally a mineral oil, may be deposited upon raw silk, or if present for any reason upon dyed or finished silk, a solution and method of extraction must fulfill certain requirements.

In our review of this problem we have had to consider the following points:

1. Effect of solvents upon the unsoaked, raw silk.
2. Effects of solvents upon the soaked silk.
3. Whether all the oil and soap is dissolved—i. e., extracted.

## EFFECTS OF COMMON ORGANIC SOLVENTS

To determine the effect of the different common organic solvents on raw silk, they were tried in the usual solvent apparatus on three of the common grades of raw silk—Japan soft-natured silk, the harder gummed Canton, and yellow Japan. The results determined were as shown in Table I, where the solvents are arranged in order of boiling points. The amount extracted in each case was dried at 100 to 150 deg. Cent., two determinations being made for each grade. Also the number of syphonings. The results are expressed in percentage, calculated on a bone-dry basis of the raw silk.

TABLE I

	Japan Soft Gum	Canton Hard Gum	Yellow Japan
1. Sulphuric ether, U. S. P. ....	0.45 0.53	0.34 0.38	0.27 0.37
2. Petrolic ether, redist. 40 to 90 deg. Cent. .	0.39 0.61	0.22 0.18	0.18 0.13
3. Carbon disulphide C. P. ....	0.18 0.43	0.24 0.32	0.30 0.21
4. Acetone C. P. ....	0.30 0.56	0.29 0.22	0.29 0.37
5. Chloroform C. P. . .	0.40 0.69	0.40 0.36	0.83 0.53
6. Refined methyl-alcohol 97 per cent. ....	0.77 2.14	0.66 0.82	1.09 1.33

7. Carbon tetrachloride

C. P. ....0.31 0.64 0.37 0.35 1.00 0.41

8. Ethyl-alcohol U. S. P.

96 per cent. ....1.60 1.98 0.57 0.83 0.87 1.35

9. Benzol C. P. ....0.31 0.60 0.26 0.48 0.64 0.39

Number of syphonings. . 10 20 10 20 10 20

Several very interesting observations were made during the analysis and upon the results. It will be noticed that the extracts from methyl-alcohol and ethyl-alcohol are the highest in every case. Also that they are noticeably higher in every case of longer extraction, when twenty syphonings were made instead of ten.

Again, on the soft gummed Japan silk every case shows a higher result for twenty syphonings than for ten, and that for sulphuric ether is the only one in which twenty syphonings are not more nearly double than equal to that for ten. This we believe to be due to the soft nature of the gum. Again, this time of extraction does not have so noticeable an effect upon the hard gummed Canton or yellow Japan grades.

We used the common market C. P. grades of solvent, and have considerable reason to believe that this also makes a difference, as it was necessary to redistill several of these solvents and slightly foreign odors were present. For instance, our ethyl-alcohol and methyl-alcohol, "C. P. acetone free," contained each more than appreciable residues, and that of the other solvents was sufficient to affect the results. Also, about 5 per cent benzol was separated from the "C. P. acetone free" methyl-alcohol, possibly due to its source of preparation.

## AMPHOTERIC NATURE OF SILK

Another factor is the decided amphoteric nature of silk; its affinity for bodies slightly acid, as well as slightly basic. Not only are there such bodies present in sufficient quantity in these solvents to affect the results slightly, but in the case of chloroform, methyl-alcohol and ethyl-alcohol, and in carbon tetrachloride, there are changes worthy of notice. It will be noticed that all of these last show somewhat higher results than the others. Moreover, some very interesting results were obtained on mixtures of certain solvents, including these. Chloroform is known to be unstable, and is stated to be preserved by the presence of 1 per cent ethyl-alcohol. Also,



the two alcohols readily oxidize to the corresponding aldehydes and become acid easily. It seems to us that these results indicate the undesirability of these solvents (chloroform, carbon tetrachloride mixtures), for the most accurate work, and also in order to get back silk most nearly in the original condition. The extraction may be complete and the amount weighed approximately correct, but greater accuracy and practically no alteration of, nor deposit upon, the silk fiber will occur with the proper choice of solvent, such as one properly purified, or a non-alcohol or non-chlorinated solvent, which has first been redistilled from silk itself. The alcohols, of course, cannot be used as solvents alone, since the fats and oils do not dissolve in them sufficiently. A little added to an inefficient solvent of oils will greatly increase the solubility of any soap present, however.

#### SULPHUR CONTENT OF SOAP OR OIL REMAINING IN SOAKED SILK

The amount of soap or oil containing the sulphur group of sulphonation which is left on the fiber after soaking, we are prepared to show, is very small, both in proportion to the amount present in the original soaking liquor and in proportion to the oil present. This applies to any silk soaked anywhere near the scientific proportions now used by up-to-date technically trained throwsters. It is very true that a great many concerns to-day simply slap in several pounds of oil and soap in excessive amounts and in proportions which have acquired some mysterious sanction.

The alcohols, when used alone, react very slightly upon silk, probably due to the oxidation referred to, since a large portion of this extract is of a saponifiable nature, has the odor of a cooking cereal, and contains up to 0.17 per cent gum, as calculated from a Kjeldahl nitrogen determination. Upon mixing a halogenated organic liquid, such as chloroform, carbon tetrachloride, trichloroethylene or tetrachloroethane, with an alcohol—such as methyl, ethyl or amyl alcohol—in various proportions from one-quarter to three-quarters, and upon simple distillation of the solvent from the raw silk, the latter when dried to constant weight at 105 deg. Cent., or at 140 deg. Cent., was found to have gained from 7 to 18 per cent in weight. This gain in weight takes place upon either the sericin or fibroin, and will be removed by the boil-off operation and can be redeposited and again boiled off from the fiber, the operation leaving nearly, but not quite, the original weight of silk.

A specimen with this deposit was found to contain 0.52 per cent chlorine. We have not yet determined the nature of this union, for such it appears to be, though loosely bound, and yet apparently not a simple absorption or mechanical deposit. It may involve a combination similar to those theoretically, and proved to take place during dyeing, and yet it may be a readily reversible chemical reaction taking in the  $(-\text{CO}-\text{N H}-)$  group of silk.

At present we are simply experimenting with the solvent action on silk, and not studying this reaction. The material extracted was found to have an appreciable saponification value. An exact figure has not been obtained, on account of normal variations in silk and impurities in the solvents. We can remove such of these impurities as react on silk, to a great extent, by distilling them off silk itself. Those smaller residues from extraction with acetone and with sulphuric ether, in the table, we found free from essential silk substance—that is, containing no appreciable amounts of nitrogen. Further on in this article we have listed a table showing the weights of recovered silk, after extraction, indicating remarkable changes.

The slight variations noted in these determinations must be laid to the natural variation in composition of all animal secretions and excretions, and of living products in general, for duplicate tests do not agree precisely.

#### EFFECT OF EXTRACTION OF SOAKED SILK

Now we must consider the effect, applying directly and especially to determinations for the trade, of extraction of silk which has been soaked, and generally after it has been thrown. This determination on thrown silk involves the removal of soap of all kinds possible, whether from hard stock, mixed, medium and soft, or from pure soft stock—i. e., from tallow, tallow and cottonseed, or palm-oil and cocoanut-oil mixtures, neatsfoot, lard or olive oils, foots, etc.; all oils which may be present—mineral or fatty, animal or vegetable, and also sulphonated oils of whatever variety; neatsfoot, cocoanut, possibly castor and certain hydrogenated and deodorized oils, such as fish oils, which may have been procured cheaply, and worked up. The use of these oils is not always based on technical and scientific reasons, but upon market price.

In considering the solubility problems involved, as the oil and soap lie on the silk, the most important points are the choice either of a solvent, a mixture of solvents, or successive extraction with two different solvents, in order to remove all the foreign material. It is clear that this opens up a wide field of possibilities, when the matter is brought down to small fractions of 1 per cent. In fact, a claim for accuracy within 0.50 per cent and less would require a sample of unsoaked silk and of the soaking liquor also. This is obvious from the variation in the extract obtained on silks of known origin. In the soaking liquor as used, soap reaches practically its complete disassociation, and physical chemists state it passes from the colloid to the electrolyte phase and has the unique property of lowering surface tension greatly. This is the theoretical ground for its penetrating and detergent power, in spite of the fact that many textbooks and teachers still cling to the old idea of a dissociated molecule as the only explanation.

#### ANALYSES OF SOAKING LIQUORS

In attempting to reach the greatest accuracy we have

to consider how much of this extract noted in the table is removed along with soap and oil. This silk-wax may run from 0.2 to 0.6 per cent. If we consider 0.4 per cent as an average and the oil extract found as 3.5 per cent, for instance, then one-tenth of that will be silk-wax, for we have not found that it is largely left in the soaking liquor.

The soaking liquor is not simply in the condition which we would expect when the oil has been removed by the silk. It will appear cloudier than before, and will show a considerable proportion of wax-like material, which is apparently a trace of gum. A few hundreds of 1 per cent is enough to cloud it. The soaking operation is understood to be not one of penetration to the extent of loosening hard gums, but only sufficient to soften them. We have made analyses of the extracted oil and found it free from nitrogen. We also find it much higher in unsaponifiable matter than any of the original materials. Also, we have observed that silk will tend to purify and clarify inert neutral liquids, and it is quite likely that the different waxes in the soap and oil and silk become concentrated in this oil-extract.

There are also the very small percentages of other substances, such as oxidized fat and soap, especially from sulphonated oils, and sulphonic salts. As for these, we know that a very large proportion of all materials not soluble in water is deposited on the silk, and very little of the water-soluble part goes on the silk.

Our analyses on this may be summarized as follows, without giving further figures:

Eighty to ninety per cent of an ordinary fatty oil present in the soaking bath is removed by the silk.

Ten per cent of the soap remains on the silk, by far the larger portion remaining in the bath.

Finally, 80 per cent of the sulphur-bearing fat of sulphonated oils remains in the bath, as well as any soluble salts present from any source.

#### LOSSES OF SILK SUBSTANCE OTHERWISE UNACCOUNTED FOR

The last question which we took up was whether there is any loss of silk substance unaccounted for by an unexplained removal of non-nitrogenous substances from silk, which contains 17 to 18 per cent nitrogen closely bound in each molecular group. As stated above, only the higher percentages of organic solvent extracts were found to contain nitrogen, and no nitrogen was found in the oil extracts. The unexpected reaction of silk with the chlorinated and alcoholic mixtures shows that an addition of a non-nitrogenous group not volatile at 140 deg. Cent. is formed. However, this remains out of the extract on account of being united with the silk itself, being capable of removal by the boiling-off operation with slight apparent effect on the silk from the standpoint of this work we are now doing. To obtain such results showing alteration in the weights of recovered silk, we compiled a series of tests on the amount of silk recovered from the

extraction of raw silk, without soaking. Three-quarters of the results show a gain in weight as shown by Table II. The figures are in percentages calculated to the bone-dry weight of original raw silk. One-fourth of the results show a loss in weight, notably in the chlorinated and alcohol solvents. These are indicated by the minus sign following the figure in the table.

TABLE II

	Japan Soft	Canton Hard	Yellow Japan	
1. Sulphuric ether U. S. P.	0.48	0.35	0.60	1.00
2. Petrolic ether redist. 40 to 80 deg. Cent. ....	0.49	0.05	0.01	0.30—
3. Carbon disulphide C. P.	0.22	0.26	(Lost)	0.11
4. Acetone C. P. ....	0.58	0.90	0.04	0.44
5. Chloroform C. P. ....	6.66	3.00	10.20	5.43
6. Methyl-alcohol 97 per cent .....	0.08	0.14	0.48—	7.90
7. Carbon tetrachloride ..	0.23	0.49	0.17—	0.18—
8. Ethyl-alcohol U. S. P. 96 per cent. ....	0.76	0.19—	0.29	1.70
9. Benzol C. P. ....	0.02	0.35	0.60—	0.31
Number of syphonings....	20	20	10	20

Each of these solvents reacts neutral in a water mixture with methyl orange and phenolphthalein indicator both before and after extraction and recovering of the solvent, or has only a small trace of acidity.

These changes in weight do not appear to affect the amount of extract within the comparatively short time required to extract all the oil present. As stated above, they may be explained by secondary reactions on the silk. The solvents are all the usual C. P. grade, and we have not tried especially purified solvents.

It is desirable to note that the extremely hygroscopic nature of silk makes it imperative to keep it thoroughly protected from the air during cooling and weighing. A weighing bottle and a fresh desiccator or similar means are essential. Bone-dry silk will gain 0.1 per cent in moisture in ordinary air in a very few seconds.

#### DEGREE OF SOAP AND OIL EXTRACTION PERFECTED

Question 3, as to whether all the soap and oil is extracted by the solvents named in the table, exclusive of the alcohols: Practically all the oil is removed, together with silk-wax, and the greater part of a sulphonated oil will be removed, but the mineral salts, oxidized and dry, saturated soda soap, some of these, although constituting only a very small percentage of the original amount, will be partially left behind. The addition of a small proportion of redistilled C. P. methyl-alcohol to one of these solvents will considerably increase the solubility of ordinary soap and of sulphonated oil. Either acetone or petrolic ether three parts to one of methyl-alcohol has worked well here. The thorough extraction effected by



a Soxhlet apparatus will enable acetone alone to extract nearly all of the deposited oil, soap and sulphur groups, this dissolving them much more readily than petroleic ether, which is also more inflammable; however, the addition of a little alcohol insures this solution. Sulphuric ether and carbon disulphide have no marked advantages over the others, and are so extremely inflammable that their continual use is likely to result in a fire occasionally if used for routine extraction. A trial made with these shows them to be much more inflammable even than petroleic ether.

#### THE TIME FACTOR

The time involved to make an extraction for commercial purposes makes some difference also. Outside of the chlorinated solvents and the alcohols (which, alone, would not extract the oils), benzol has a sufficiently higher boiling point than acetone to extend the time required for extraction and for drying considerably, and also gives a darker colored extract.

Then we tried adding a little water to the solvent, possibly increasing the solubility of the sulphonated oils. As noted above, the water-soluble portion of these oils largely remains in the water during thorough soaking. Occasionally we have had a skein for extraction which seemed to have been soaked in such a way as to retain more than usual of this part of the oil. While the other solvents continue to extract the oils in the presence of water, practically as thoroughly as before, the total amount dissolved does not appear to be increased by adding water. There is, in every case, a very small portion remaining, and we believe this is more than canceled by the small amount of silk-wax dissolved; under usual conditions it is negligible.

As to the amount of silk removed by mixed solvents, such as acetone plus some methyl-alcohol, it appears to be very close to the amount proportional in Table I for equal time. Prolonged extraction we have shown to slightly affect the silk substance.

In all ordinary cases seven or eight syphonings are about right. We do not believe it is advisable to set up the apparatus and let it run for a long time to insure complete extraction.

A curious fact with regard to the odor left by the solvent is that in three totally different series of extractions, when the silk had been extracted and dried to constant weight and duplicate weighings made at 135 deg. Cent., on moistening this silk with water the odor of the solvent used could be detected. This was especially noticeable in the case of acetone, and somewhat for chloroform and ethyl-alcohol, less so for benzol. It is well known that the odor of many substances is due to traces of impurities. Silk seems to remove some of these, and perhaps retain some of the solvent also.

It is also well known that gases have extremely high surface absorption, even at high temperature. For instance, the complete removal of air and other gases from vacuum apparatus is difficult.

#### CARE IN SAMPLING IS IMPERATIVE

Finally, we urge the greatest care and judgment in the sampling of silk to be extracted. We have found notable variations in the amounts of oil on successive windings from the same cop, bobbin or skein. Skeins soaked side by side in the same bath will take up different amounts of oil. That part of the silk which first enters the bath will take up the most oil. Being largely a surface condition, the oil will concentrate or distribute itself at different points. The number of samples for extraction should be proportional to the importance of the case, and especially if only one sample is taken it should be as thoroughly representative as possible.—“Silk.”

#### “FIBRE & FABRIC” IN NEW QUARTERS

Our contemporary “Fibre and Fabric” announces the removal since May 1 of its former office, 127 Federal Street, Boston, Mass., to 465-475 Main Street, Cambridge 39, that city, where members of the staff will in future be glad to welcome all callers as before.

#### ATLANTIC ADDS H. C. BROWN TO SALES FORCE

H. G. Brown, of Philadelphia, Pa., has joined the sales force of the Atlantic Dyestuff Company and will visit the trade through eastern Pennsylvania and southern New Jersey territory. Mr. Brown is a graduate of the Philadelphia Textile School and has covered the textile trade for the past ten years representing the Hyde, Rakestraw Company and the Turner-Halsery Company. Through his past experience he is well fitted for both technical and sales duties in his present capacity.

#### BUTTERWORTH-JUDSON CORP. IN RECEIVER'S HANDS

Thomas G. Haight and Henry G. Atha, of Newark, N. J., and James O'Brady, of New York City, the latter president of the Butterworth-Judson Corporation of New York, have been appointed receivers of the Butterworth-Judson Corporation in the United States District Court by Judge Hand.

The corporation, which is capitalized at \$2,500,000, has its plant at Newark Bay. It was said to have turned out during the war 95 per cent of all the picric acid used by the Allies. Since that time it has been turning out commercial chemicals, but at a decreased volume.

The chief complaining creditor, the Hay Foundry & Iron Works, Newark, with a claim of \$18,000, is represented by Breed, Abbott & Morgan. The other creditors are represented by Rushmore, Bisbee & Stern. The corporation is represented by Chadbourne, Abbott & Wallace. It was said in court that the corporation's assets were believed to equal or exceed its liabilities, that it had been conservatively managed, and that its affairs had been found to be in good order, but reduced business made an adjustment and accounting necessary.

# Testing and Standardizing Dyes

The Model Dyehouse—Taking Samples—Various Recommended Processes—Chrome Colors—Examination of Dyeings

By E. GREENHALGH

**I**N the manufacture of coal-tar colors it is often found that variations of shade and strength occur between subsequent successive lots of one color; in fact, one lot may be of a high strength, while the succeeding one may be only 75 per cent as strong. A variation of shade may result from two consecutive productions, one being reddish in tone, while the other appears, when dyed, to possess a greenish or grayish cast. It is obvious that colors cannot be delivered to the user indiscriminately, and that every lot of color should conform with a recognized standard in strength, shade, tone, and other properties before delivery to the user.

## THE MODEL DYEHOUSE

This work of standardization is carried on in the works dyehouse in miniature, thus giving facilities of making bulk mixings on a large scale in another portion of the works, where the color can be ground to a fine powder and mixed with other ingredients so that the resultant color will exhibit similar properties to the required standard.

Before proceeding to the actual testing and standardizing methods used for coal-tar colors it is advisable that some idea be conveyed as to the plant of an experimental dyehouse. The apparatus should consist of several dye baths of various styles; for instance, there should be at least two or three large baths containing calcium chloride, sodium nitrate, salt or other substance tending to produce a higher boiling point, while quite a reasonable number of air baths and ordinary water baths should always be available. These baths should each have a cover containing holes large enough to contain and hold the dye pots.

The dye pots should be of porcelain or thick glass of a special nature, and should be of various sizes, according to the bulk of material to be dyed; there should be present in every dyehouse porcelain or thick glass beakers capable of holding anything from 100 c.c. to 1 liter. Stout glass rods varying from three-eighths to five-eighths of an inch thick and of twelve to fourteen inches long, turning to the fabric in the dye liquor. As in nearly every case of dye testing it is necessary to make a solution of the color, a good balance, sensitive to 0.01 grain, and several flat bottomed flasks of all sizes are necessities, and a good range of measuring cylinders should be provided. The flasks containing the dye solutions need to stand boiling, either on a

wire gauze or a hot plate. Other pieces of apparatus, such as pipettes, a few burettes, funnels, casseroles, watch glasses, etc., also find use in the dyehouse equipment.

After dyeing a fabric it is necessary to dry it, and for this purpose a small hydro-extractor, or a mangle having rubber rollers should be placed in a convenient position near the drying stove, so that, after eliminating a good portion of the excess water, the goods can be dried right away. The drying stove should be heated by a steam coil and well ventilated, care being taken that no drops of water are allowed to form inside. Precautions should be taken to prevent the rise of temperature above a certain limit (180 to 200 deg. Fahr.). In most up-to-date dyehouses there is always a daylight lamp, by which shades can be examined in dark weather or at night time.

Textile fabrics can be obtained from manufacturers in convenient lengths or weights, and where yarns are to be used hanks of 75 to 150 grains should be procured, thus saving time in winding. In the case of cloth, this is best obtained in the piece and cut to the required size. The actual state of the dyes should be noted, including the fineness of the powder, the size and perfectness of the crystals, and whether damp or overdry.

## TAKING SAMPLES

In taking samples of color it is advisable to draw two or three from different parts and subsequently mix these by hand in a mortar. This should be done particularly where other products have been added to bring the color up to strength or shade. The sample should now be weighed out, in duplicate, against its required type, and carefully transferred to a measured flask or other convenient vessel, there to be made up to a given volume with distilled water at 60 deg. Fahr.

This liquor, after careful agitation, is transferred to a flask, and the temperature raised to the boil on a wire gauze or hot plate, the flask being removed as soon as boiling commences. The solution of the dyestuff should be compared with the type and any differences noted.

Each sample to be dyed should be brought to a given weight. The required amount of dyestuff is now pipetted into a dye pot and water of a required temperature added to make a given volume. The fabrics, either wet or dry, as occasion requires, are now en-



tered, and dyeing is carried on according to instruction. After the dyeing is completed the goods are washed, wrung and dried, and finally labeled up for examination.

Judging the shades should always be done in a north light, and no other light should be allowed to enter the room, as only by this means can accurate conclusions be reached. In every dyehouse there should be set apart an enclosure which receives only light from the north.

The first series of dyestuffs which will be considered are the acid colors. In every case a certain solution is made up, and for guidance in this matter it is recommended to produce a  $\frac{1}{2}$  per cent solution of the color by dissolving four parts by weight and making up to 800 parts and boiling. At this stage it is well to have all the samples balanced to a given weight, which, for the purpose of a reliable test, should be about 150 grains.

#### THE PROCESSES

Process 1.—Recommended for use in the cases of Croceins, Ponceaux, Acid Orange 11, and other brands, and other similar azo acid dyestuffs.

The dye bath is made up of 400 to 500 parts boiling water along with one-half part of 10 per cent solution of Glauber's salt. An addition of six parts of a 5 per cent solution of sulphuric acid is now made, and the woollen samples are immersed for five minutes. The goods are now raised, while the color solution is added, and in this case color enough to produce 2 per cent is usually taken. This represents a volume of parts of dye liquor for parts of material.

Dyeing is continued at the boil for fifteen to twenty minutes, when a further quantity of a 5 per cent vitriol is added, about two to four parts, and the process carried to the exhaustion of the dye bath, which in these cases should practically go water clear. In order to improve the tone and brightness of these dyeings it is well to stir the goods continually in the exhausted bath at the boil for at least fifteen minutes.

Process 2.—For colors such as the Phthaleins, Fosine, Kanthrosine and Carmoisine, Lanafuchsine, Azo Magenta and Violamine.

The dyeing is carried on in practically the same method as in Process 1 except that the dye bath is started with the following:

400–500 parts water at 160 deg. Fahr.

5–7 parts 10 per cent solution ammonium acetate.

2–3 parts 5 per cent solution sulphuric acid.

Dyeing is carried on as before.

Process 3.—For sensitive colors, particularly the dyes derived from the tetra-hydroxyanthraquinones. Alizarine Saphirol and Rubinol, also colors such as Naphthylamine Blacks, Acid Blacks and Naphthol Blue Black.

The dye bath is started with:

400–600 Parts water at 140 deg. Fahr.

3–4 parts 10 per cent ammonium acetate.

3–4 parts 5 per cent acetic acid.

The goods are wet out and the requisite amount of color solution either for 1 per cent (20 parts), 2 per cent (40 parts), or 4 per cent (80 parts) is added, and dyeing carried on till the bath is boiling. A further addition of three to four parts of 5 per cent acetic acid is now made, and dyeing continued at the boil for half an hour, when the bath should be near exhaustion. The dye baths are cooled down to 190 deg. Fahr., and an addition of two to four parts of 5 per cent sulphuric acid is made and dyeing recommenced and carried on at the boil until the baths are exhausted. The goods are taken out, well wrung, washed in both hot and then cold waters and dried.

Process 4.—For individual colors which are affected or unduly precipitated by vitriol, also for dyeing of chromed colors, which are destroyed by using bichrome along with vitriol.

The dye bath is made up with:

400–500 parts water at 175 to 190 deg. Fahr.

10–15 parts 10 per cent sodium sulphate, or

3–5 parts 10 per cent ammonium acetate.

5–6 parts 5 per cent acetic acid.

The goods are well wet out in this bath for five minutes, and the color solution added. Dyeing is carried on at the boil for fifteen to twenty minutes, when an addition of a further five to six parts of 5 per cent acetic acid is made, and dyeing continued until exhaustion. In the case of after-chromed colors it is advisable at this point to cool down the bath to 190 deg. Fahr. and add three to four parts of 5 per cent acetic acid and two and a half to three parts of 5 per cent bichromate of soda. The after-chroming is now carried on at the boil for thirty minutes.

#### CHROME COLORS

In the case of certain chrome colors the color itself is partially insoluble and requires the aid of a small amount of alkali, such as ammonia or soda ash, to bring about perfect solution. Certain chrome colors have to be dyed by the use of vitriol, and Process 2, together with the additions mentioned above for after-chroming, will answer.

Process 5.—For the application of colors by the metachrome process. Examples of this class of color are the metachrome series and certain other colors requiring a mordant.

The dye bath is made up with:

- 400-500 parts water at 120 to 140 deg. Fahr.  
 1-2 parts 5 per cent ammonia.  
 4-5 parts 5 per cent Metachrome Mordant.  
 15-20 parts 10 per cent Glauber's salt.

The requisite amount of color solution for 2 per cent shade (40 parts) is now added, and the goods, previously wet out in boiling 1 per cent acetic acid and subsequently well squeezed, are entered. The temperature of the bath is raised slowly to the boil over a period of thirty minutes, and then continued at this temperature for a further forty-five to fifty minutes, when the bath should be exhausted. The color is simultaneously dyed on the fiber and chromed by the gradual decomposition of the metachrome mordant. Metachrome mordant acts precisely in the same way as reduced chrome mordant on wool.

Process 6—Colors dyed on chrome mordanted wool, such as Alizarine Green and Blue Black.

The wool to be dyed is first mordanted by boiling for two to three hours in a bath containing:

- 2-3 per cent bichromate of soda.  
 3-4 per cent cream of tartar.

The dye bath is made up of 400 to 500 parts water at 140 deg. Fahr. and the requisite amount of dye solution. The goods are entered and the temperature raised to the boil in about fifteen minutes, when an

addition of two to three parts of 5 per cent acetic acid is made, and dyeing continued at the boil until the color has all gone onto the fiber.

#### EXAMINATION OF DYEINGS

This practically covers the whole field for the testing of colors on wool. Every difference between any color and its standard should be noted, and even if the sample exhibits better properties it should be made to conform with the standard. In the shading of colors it is advisable to use pure colors and not mixtures; a certain shade of red may need dulling. In this case use either a pure acid black like Naphthylamine Black or Naphthol Blue Black instead of an ordinary acid black, which may be a mixture of all kinds of colors, such as Orange 11, Metanil Yellow, with Naphthol Blue Black or other convenient base. In every case of shading make a mixing in solution in the dye house, then make a small mixing in powder, and if both mixings conform to standard proceed in like manner with the bulk stuff.

All color which cannot be made to standard, either in strength, shade, tone, etc., should be reported. In the reduction of all colors used for wool use Glauber's salt alone or together with a small quantity of dextrine, but never use common salt as this is sometimes undesirable.—"Dyer and Calico Printer."

## Dyeing Worsted Piece Fabrics

Proper Scouring Essential to Good Work—Notes on Precautions in Scouring—Rinsing After Scouring—Temperature—Soft Water Eliminates Later Difficulties—Washing After Carbonizing—Handling of Goods in the Dye Bath—Unmentioned Changes in Manufacturer's Cloth Stock Make Matching Difficult—Obtaining Wide Range of Shades with Few Dyes—Working Suggestions

By LOUIS J. MATOS, Ph.D.

*National Aniline & Chemical Company*

**F**ABRICS for women's wear, particularly in the light weights, are chiefly worsteds, and for their successful manufacture, outside of the strictly mechanical operations up to and including the weaving, considerable care and attention to some of the details are necessary.

The most important operation essential to good work is in the scouring of the cloth. Fabrics that have not been thoroughly scoured free and clean of the lubricating oils used on the wools, are likely to show distinct marks when they reach the finishing room. Cloth scouring involves the use of a good and practically odorless soap, a sufficient volume of scour liquor, and a more or less close regulation of temperature and time. The choice of soaps for the better class of goods depends much upon the skill and judgment of the workman who does the work; if he is accustomed

to handle the better grades of fabrics, he will make use only of such soaps that dissolve readily and rinse out freely without leaving the peculiar and characteristic odor commonly found on many fabrics.

#### PRECAUTIONS NECESSARY IN SCOURING

Regarding the volume of scour liquor for piece goods, it is only necessary to direct attention to the main feature of the scouring operation which is to loosen and emulsify the oils on the fibers. This means that there should be a sufficient amount of liquor to work the cloth in, and to flow freely from the goods as they pass out of the liquor, and over the roller. It is this mechanical action of the flowing scour liquor that effects the removal of the oils without injuring the texture. The use of a small amount of ammonia



has always been found to act advantageously: usually not more than one or two per cent is added to the scour bath, but this is a matter for the workman in charge to determine.

As to temperature of the bath, any increase over 120 deg. Fahr. is injurious to the wool, causing it to soften, and consequently "felt." The common practice of judging the proper working temperature of the scour bath by immersing the hand for a moment is unsound, since different individuals are affected by hot or warm liquids differently. The only safe guide is a thermometer, and its use should be insisted upon by the "boss." Taking chances in such matters is the general cause of "seconds."

Rinsing after scouring is equally as important as the scouring itself, and no pieces should be permitted to leave the washers until they are known to be free of soap. The presence of soap in the goods works to a disadvantage either in the carbonizing bath, or in the dye bath, owing to the liberation of free fatty acids that remain adhering tenaciously to the cloth.

#### WATER SOFTENING PLANT IS ALWAYS ADVANTAGEOUS

Of course, to wash soapy cloth clean means that the mill must have an ample supply of soft water. Without soft water the results are not entirely satisfactory. Many mills are troubled with a water supply that fluctuates in quality, and they do not know it. It is not sufficient to have the water analyzed from time to time, without installing a plant that will ensure a delivery of pure water to the scour boxes and the dye-house. A water softening plant for a moderate sized mill is rather costly, but the sacrifice necessary to such an installation is offset by the subsequent freedom from scouring and dyeing troubles. Clean goods are necessary for perfect dyeing—oils or soap remaining on the cloth will prevent the dye going on the fabric evenly, and no amount of coaxing in the dye bath will overcome the difficulty. Thoroughly cleansed fabrics lessen the labor of both the dyer and finisher.

For worsteds generally, the dyer should select those dyes that go on wool slowly, since such dyes always produce even shades, but their use will not take the place of good scouring and washing. The usual tendency is to hurry the work of scouring, trusting that the subsequent operations will eliminate any defects. Whatever the cause of defective pieces, the results always show prominently after finishing.

#### WASHING AFTER CARBONIZING

When worsted cloth is to be carbonized, it is necessary that the goods be afterwards well washed to make sure that the remaining traces of carbonizing chemicals or acids are removed. While some classes of goods may be dyed directly as they come from the carbonizing ovens, and with good results, it is still an ad-

vantage with the finer fabrics to wash well before dyeing. This is particularly true when aluminum chloride has been used.

In dyeing worsted cloth, the less the goods are worked in the hot dye bath, the better, but it is desirable to wet them thoroughly in the dye kettle as it is filling up with water. A few minutes' run usually suffices, during which time the steam may be gradually turned on, but not allowing the temperature to go beyond 120 deg. Fahr.

As a rule, several pieces of one shade are dyed in the kettle at one time. When the temperature is right, the proper amount of dyestuff for the desired shade is added, the cloth continued in motion until thoroughly saturated with the dye, and then the oil of vitriol previously diluted, slowly poured in. From this stage, the temperature is to be slowly raised to the boiling point, and kept boiling for three-quarters to one hour.

Where the identity of the cloth is known to be the same, matching against standard shades found in commercial shade cards is relatively easy, and usually no shading is necessary; but in almost every other case, the dyer is called upon to add additional, though small, quantities of dyes to "bring up" the shade to match the sample.

#### DYER SHOULD BE INFORMED OF CHANGES IN MANUFACTURER'S CLOTH STOCK

Matching to sample calls for the best skill of a dyer. In dyeing the first set of pieces to match a given sample the dyer is necessarily watching the work every minute, since a slight excess of color may so alter the shade that the pieces could not be offered as a match. It must be said, however, that the average dyer has proven himself to be equal to the emergency, and few serious errors are to be noticed. After the first "set" of pieces is out, then the repeat orders are handled without difficulty. One of the troubles that the dyer has to contend with is the change in quality of the goods delivered to him. It is a matter of frequent occurrence that a dyer is ordered to dye, for example, a batch of ten pieces to match a given shade, and the results are satisfactory not only to the mill, but to the customer. In course of time, a repeat order is received, and another batch of ten pieces is sent down to be dyed. It is found that during the dyeing, they do not "come up" like the previous lot, although everything has remained the same so far as supplies, etc., are concerned. After some trouble on the part of the dyer, a match is obtained in the dyehouse, but it is found out later, when the cloth has gone through the final finishing operations, that it is not identical with the first batch. In most instances of this matter, the trouble originates with a change in the stock employed in making the cloth, and which is noticeable by the performance of the cloth in the dyehouse; but the dyer, not being informed that a change has been made, as-

sumes that the cloth is identical with the original batch, and proceeds with the work accordingly. While the counts of yarn and the weave remained the same, the stock was altered. It is remarkable how slight differences in the stock will materially alter the procedure in the dyeing process.

In adding dyes to the bath, they should be first brought into complete solution with hot water, and strained through fine cloth. This is necessary because some dyes dissolve more readily than others, and for perfection in dyeing, complete solution is essential. In dyeing delicate shades, such as grays, drabs, etc., the dissolved dyes should be added to the bath in several portions, and not all at once.

#### USE OF FEW DYES FOR WIDE RANGE OF SHADES

Like a true artist, the most skillful dyer is he who can produce the widest range of shades with the fewest foundation or primary dyes. On reference to the recently issued National Shade Card, showing mode shades on ladies' dress goods, one sees the importance of the above remark. There are illustrated forty-eight dyeings varying from pale salmon through a gamut of intermediate shades, to dark blues, greens, browns, etc., and placing in the hands of the dyer suggestions which will enable him to produce hundreds of other shades that are called for from time to time by the dress goods trade.

The foundation dyes are seven in number, and show the possibility of using, with discretion, blues, reds and yellows—not including black. With these seven dyes the worsted dyer who familiarizes himself with their working qualities is in an enviable position.

The following working suggestions for a variety of shades will prove of interest to dyers of the general class of goods above referred to. The quantities given are for batches of 100 pounds each:

BROWN—		Lb.	Oz.
National Wool Orange 2G Crystals.....	1	14	
National Fast Crimson GR .....	0	5	
National Alizarine Sapphire FS .....	0	5	
SMOKE—			
National Wool Yellow Exera Conc. ....	0	4	
National Fast Crimson 6BL .....	0	3½	
National Alizarine Sapphire FS .....	0	4¾	
BRONZE—			
National Wool Yellow Extra Conc. ....	2	5	
National Wool Crimson 6BL .....	0	15	
National Alizarine Sapphire FS .....	0	0	
OLIVE GREEN—			
National Wool Yellow Extra Conc. ....	0	5	
National Wool Orange 2G Cryst .....	0	4¼	
National Alizarine Sapphire FS .....	0	14	
MEDIUM BLUE—			
National Wool Yellow Extra Conc. ....	0	¾	
National Wool Alphazurine 2G .....	0	2	

National Alizarine Sapphire FS .....	1	6
CARDINAL—		
National Wool Orange 2G Cryst. ....	2	0
National Fast Crimson 6BL .....	1	12
LIGHT BLUE—		
National Alphazurine 2G .....	0	3
National Alizarine Sapphire FS .....	0	1½
SALMON—		
National Wool Orange 2G Cryst. ...	0	1½
National Fast Crimson GR .....	0	½

### Review of Recent Literature

*Fire Hazards in Chemical Plants.* A Study by the National Fire Protection Association. "Chemical Age," April, 1922; p. 181.

It is difficult to devise an adequate classification of special hazard fires, which total 71 per cent of the known causes of fires, because in many instances the rapidity of the spread of the fire has prevented ascertainment of the exact cause. Accordingly, in the tables furnished in the present article, many of these fires have been attributed to the rather indefinite items of "Ignition of Chemical," "Ignition of Inflammable Vapor," etc. The majority of recorded fires were preventable and due to carelessness. The sprinkler record is regarded as very satisfactory, only 5½ per cent failing to operate. Wet and dry systems are indicated to be about equally efficient. The average number of sprinkler heads opening is 23, indicating the severity of fires in this occupancy, and 80 per cent of the fires causing losses above \$1,000 occurred in unsprinkled properties. Author lists fifteen "special hazard" causes, such as Ignition of Chemical, Foreign Substance in Grinding Mill, Overheating of Kettle or Oven etc., and twelve "common causes," including Matches, Sparks from Locomotive, Defective Wiring, etc. The summary shows common causes as 24 per cent and special hazard causes as 58.8 per cent, of the total, the balance being listed as "unknown causes." The tables analyze 473 fires in industrial plants.

Among special instances given is described a fire in the grinding room of a plant manufacturing coal-tar dyestuffs. The grinders consisted of a number of discs revolving at high speed. The material to be ground is thrown against a wide steel ring, inside of which the discs revolve. The ground color is discharged from the mill with considerable velocity into horizontal steel-cased mixers. A vent to relieve air pressure is provided in the form of a cloth balloon with a return pipe to the grinder.

An iron bolt accidentally got into the grinder and when a spark was struck, fire instantly flashed through



to the mixer and out again into the balloon, where a mild explosion took place. The flame flashed through the room and to the floor above. Sprinklers did good work in extinguishing the fire, although several barrels of color burned for some time. The loss was small considering the severity of the fire.

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*The Lubrication of Wool.* A Discussion of the Oils and Methods Used in Lubricating the Wool Fiber during the Spinning Process. B. X. C. Baily. "Canadian Textile Journal," April 25, 1922; p. 162.

In lubricating wool for combing it is perhaps not quite so necessary to think about dyes, as most of the work is done in the white; great care must be taken, though, to see that the tops are a good white; in Bradford it is common to blue the tops in the back-washing machine to do away with any tint of yellow that is likely to appear on the wool.

Animal oils are likely to set on the wool, thus making it difficult for the scourer to eliminate; this is especially so in cases where the yarn has to wait a considerable time before it is woven up, as, for example, worsted yarn shipped from Bradford to Japan; in cases like this a little mineral oil is added to the oil that is put on the wool, and this seems to be fairly satisfactory. This also is the case with vegetable oils, and it is very necessary to avoid oils that dry rapidly. In the Canadian trade the yarn does not, however, usually have to wait so long and therefore this point is not so important.

Owners who use cheap grade oils should carefully consider their bills for detergents, and will probably find that the price of oiling and washing and steaming, if added together, will be very little less than if a high grade oil had been used. The amount saved will at any rate be found to be out of all proportion to the large difference in appearance of the goods turned out.

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*Patents and Chemical Research.* H. E. Potts. 198 pages; 8s. 6d.; The University Press of Liverpool.

This is an able presentation in condensed form of the elementary principles of English patent law in the language of the chemist-layman.

The author is an experienced English patent agent and he addresses himself primarily to the director of industrial chemical research and to the manager of the chemical manufacturing plant. The impelling purpose of the book is stated in the preface as follows:

"Therefore it is most desirable that chemists should familiarize themselves with the leading principles of patent law; first, to enable them to co-operate with the patent agent and thus contribute to the object of obtaining secure protection for their inventions, and, second, so that their criticism will stimulate patent agents to maintain the highest level of professional skill. In this way, better work will be done, and the

greatest benefits will be derived from the patent system."

Throughout the text, hypothetical as well as actual chemical cases are freely used with remarkable success for purposes of illustration. The first chapter is entitled "Patents as an Element of Business Policy," and deals especially with the relative advantages of patenting as against secret working as a means of protecting valuable chemical processes under the English law. The remaining chapters, except the last, deal with the cardinal principles of the English patent system. The last chapter treats briefly of the patent systems of other countries.

The book is well indexed but one might wish for more clearly marked subdivisions of the subject matter of the different chapters. There is a special index of cases, and subject titles of many of these cases are given in chemical terms—a distinct help to the chemist-reader.

The exposition primarily concerns the English patent system rather than that of the United States, and although many fundamental concepts are common to both systems it may not be amiss to caution the American chemist-reader against applying too directly in this country conclusions derived from a study of this book alone. The chapter entitled "Patents in Other Countries" will be helpful in indicating the numerous possible pitfalls in this direction.

In the opinion of the reviewer no single publication in recent years has greater potentialities for increasing the real effectiveness of systematic industrial research than the appearance of this book. A corresponding book dealing primarily with the United States patent system is greatly to be desired.—A. S. McDaniel through "Jour. Ind. and Eng. Chem."

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*The Decortication of Fibrous Plants* H. R. Carter. London: Bale, Sons & Danielsson, Ltd. 4s. net.

Cotton spinners are fortunate in the sense that they have never had cause to realize the amount of labor that must be expended in producing spinnable material from most other fibrous plants. The separation of flax, hemp, and jute fibers from the woody or pulpy matter with which they are associated as they come from the field or plantation, is only accomplished by a very considerable amount of labor, some of which is distinctly disagreeable. This separating process is termed decortication, and in the present volume of 80 pages, Mr. Carter gives a description of the requirements of the process in general, and also brief descriptions of various types of machines and apparatus now available for the process. The separation of stem fibers is much more easily accomplished than the separation of leaf fibers, and both the processes and the mechanisms used are very different. Stripping the leaves of phormium (New Zealand flax), cleaning Manila hemp, sisal hemp, hard-fiber decorticators, are

dealt with in turn; and then the author gives a long chapter describing in detail the various methods of retting practised in Europe.

*Yarn Printing.* British Patents 175,310 and 175,584; C. Alvord, Worcester, Mass.

Apparatus described is chiefly designed for printing, before weaving, yarn to be used in the manufacture of carpets, pile goods and upholstery.

The printing rollers are mounted on an intermittently reciprocating carriage, so that patches of color are laid on the threads of yarn lying side by side on a support. The application of color and the determination of the distances apart of various color impressions are controlled by jacquered mechanism, which brings about the rotation of the yarn-supporting cylinder alternately to the operation of the coloring mechanism. Numerous devices are provided for varying the intervals and lengths of color application. Color scrapers are also provided for removing ridges of color dye formed between contiguous color stripes.

## Recent Patents

### Ortho-oxyazo Dyes

(1,408,297; February 28, 1922)

WILHELM HERTZBERG, Berlin-Wilmersdorf, and OSWALD SCHARFENBERG, Berlin-Schöneberg (assignors to Actien Gesellschaft für Anilin Fabrication)

This relates to new orthooxyazo dyes which may be obtained by combining a polyhalogen-2-diazo-1-oxyderivative of the benzene series with an acidylaminooxynaphthalene sulphonic acid. These new dyes form in the dry pulverized state of their sodium salts dark powders soluble in water with blue to violet color, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide, by an acid a violet-red precipitate being separated.

The new dyes when dyed in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, furnish on wool blue tints of an excellent fastness to the action of light, to washing and to milling; the same shades being obtained by dyeing on wool mordanted with a chromium mordant or by dyeing wool in an acid bath and treating these tints afterwards with a chromium mordant. In order to illustrate the product, the following examples are given, the parts being by weight:

1. 21.3 parts of 3,4,5-trichloro-2-amino-1-oxybenzene are diazotized by means of 6.9 parts of sodium nitrite and 50 parts of hydrochloric acid of 12 deg. Be. spe-

cific gravity. The diazo compound is allowed to run into a solution of 28.1 parts of 1-acetylamino-8-oxynaphthalene-4-sulphonic acid, alkaline with sodium carbonate. The dyestuff is salted out and worked up as usual. It dyes wool with chromium mordants blue tints of an excellent fastness.

2. The diazo-compound of 21.3 parts of 3,4,6-trichloro-2-amino-1-oxybenzene is coupled with 39.3 parts of 1-toluol-sulphamino-8-oxynaphthalene-4-sulphonic acid in a solution containing sodium carbonate. The dyestuff separated in the usual manner dyes wool with chromium mordants blue tints.

3. The diazo compound of 19.2 parts of 4-methyl-3,5-dichloro-2-amino-1-oxybenzene is united with a solution of 28.1 parts of 1-acetylamino-8-oxynaphthalene-4-sulphonic acid, alkaline with sodium carbonate. The dye is worked up in the usual manner; it dyes on wool with chromium mordants reddish blue tints.

Claims allowed include:

1. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide, yielding upon reduction a polyhalogen-2-amino-1-oxyderivative of the benzene series and a monoacyldiaminooxynaphthalene-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a polyhalogen-2-diazo-1-oxyderivative of the benzene series with an acidyl-amino-oxynaphthalene-sulphonic acid.

2. The new orthooxyazo dyes which form in the dry shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium hydroxide, yielding upon reduction a polyhalogen-2-amino-1-oxybenzene and a monoacyldiamino-oxynaphthalene-sulphonic acid dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a polyhalogen-2-diazo-1-oxybenzene with an 1-acetylamino-8-oxynaphthalene-sulphonic acid.

3. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color from which an acid separates a violet-red precipitate, the aqueous



solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide yielding upon reduction a polychloro-2-amino-1-oxybenzene and 1-acidylamino-7-amino-8-oxynaphthalene-4-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a polychloro-2-diazo-1-oxybenzene with 1-acidylamino-8-oxynaphthalene-4-sulphonic acid.

4. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide yielding upon reduction a trichloro-2-amino-1-oxybenzene and 1-acidylamino-7-amino-8-oxynaphthalene-5-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a trichloro-2-diazo-1-oxybenzene with 1-acidylamino-8-oxynaphthalene-4-sulphonic acid.

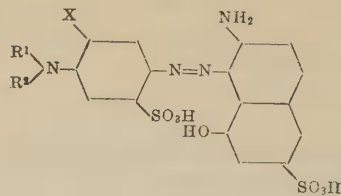
5. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium-hydroxide, yielding upon reduction a trichloro-2-amino-1-oxybenzene and 1-acetyl-amino-7-amino-8-oxynaphthalene-4-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a trichloro-2-diazo-1-oxybenzene with 1-acetyl-amino-8-oxynaphthalene-4-sulphonic acid.

#### Azo Dyes

(1,408,405; February 28, 1922)

BERNARD SCHONER and OTTO SIEBERT, Dessau, Anhalt, Germany (assignors to Actien Gesellschaft fur Anilin Fabrication)

This describes new azo dyes as free acids corresponding to the general formula:



$R^1$ ,  $R^2$  meaning substituents, such as hydrogen, alkyl-, aralkyl-, acidyl-groups, X meaning an univalent substituent.

Such dyes are obtained by coupling in acid medium 4-aminodiazobenzene-2-sulphonic acid derivatives with 2-amino-8-naphthol-6-sulphonic acid. The same dyes may be manufactured by combining 2-amino-8-naphthol-6-sulphonic acid with 4-nitrodiazobenzenesulphonic acid, by reducing the nitro group and by substitution of the resulting amino group in the desired manner. The new dyes form in the dry state dark powders soluble in water with bluish red color, less soluble in alcohol, unsoluble in ether and benzene. By reducing agents they are destroyed. They dye on wool bluish red tints of a very good fastness to the action of light and to washing and equalize in an excellent manner.

The following examples serve to illustrate, the parts being by weight:

1. Twenty-six parts of the 6-acetyl-amino-3-amino-1-methoxybenzene-4-sulphonic acid are diazotized in the usual manner and united with twenty-four parts of 2-amino-8-naphthol-6-sulphonic acid which may be dissolved in an alkali and separated by addition of an acid in form of a fine precipitate. In order to finish the reaction sodium acetate is added. The resulting dye is salted out, filtered and dried. It forms in dry state a dark powder, soluble in water with reddish blue color, less soluble in alcohol, unsoluble in ether and benzene. By reducing agents it is destroyed. It dyes on wool bluish red tints of an excellent fastness to the action of light.

2. The dye which may be obtained by coupling of the diazo compound of 21.8 parts of 4-nitro-aniline sulphonic acid with twenty-four parts of 2-amino-8-naphthol-6-sulphonic acid and by reducing the nitro group is mixed with 400 parts of water and 250 parts of methyl alcohol. Twelve parts of sodium carbonate and twenty parts of methyl iodide are added; the mixture may be heated for three hours in an autoclave to 95 to 100 deg. Cent. Then the methyl alcohol and the excess of methyl iodide are eliminated by distillation and the dye is separated by common salt. It forms in the dry shape a dark powder, soluble in water with bluish red color, less soluble in alcohol, insoluble in ether and benzene. By strong reducing agents it is destroyed. It dyes wool beautiful bluish red tints of a very good fastness.

3. The sodium salt of the dye 4-aminoaniline-2-sulphonic acid-azo (1) 2-amino-8-naphthol-6-sulphonic

acid (compare example 2) is treated in aqueous solution with the corresponding quantity of acetic anhydride. The dye is separated by addition of common salt. It forms in dry state a dark powder, soluble in water with bluish red color, less soluble in alcohol, insoluble in ether and benzene. By strong reducing agents it is destroyed. It dyes wool in bluish red tints of very good fastness.

4. The solution of fifty parts of the sodium salt of the dye 3-aminoaniline-2-sulphonic acid-azo-(1) 2-amino-8-naphthol-6-sulphonic acid in 250 parts of water is heated to 75 deg. Cent. and stirred with sixty parts of benzoyl chloride. In the course of an hour ten parts of calcium carbonate are added. The mixture is stirred for an hour, the temperature being kept at 75 deg. Cent. The dye is separated with common salt. In the dry state it forms a dark powder, soluble in water with bluish red color, less soluble in alcohol, insoluble in ether and benzene. It is destroyed by strong reducing agents and dyes on wool bluish red tints of a very good fastness.

#### Ortho-oxyazo Dyes for Wool

(1,408,296; February 28, 1922)

WILHELM HERZBERG, Berlin-Wilmensdorf, and OSWALD SCHARFENBERG, Berlin-Schöneberg, Germany (assignors to Actien Gesellschaft für Anilin Fabrication)

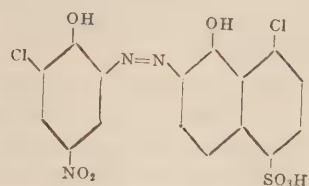
By combining a diazotized 2-amino-phenol derivative which contains negative radicals such as halogen, nitro-group with 8-halogen-1-oxynaphthalene-5-sulphonic acid new valuable dyestuffs for wool are produced the chromium lakes having a very good fastness.

They form in the dry pulverized state dark powders soluble in water to a violet solution and are insoluble in alcohol, ether, benzene, being destroyed by strong reducing agents and dyeing on wool with chromium mordants black to greenish black tints. The following example illustrates, the parts being by weight: 18.9 parts of 2-amino-4-nitro-6-chloro-1-oxybenzene are diazotized by means of 6.9 parts of sodium nitrite and 50 parts of hydrochloric acid of 12 def. Be. specific gravity. The diazo compound is coupled with 26 parts of 8-chloro-1-oxynaphthalene-5-sulphonic acid in a solution containing sodium carbonate. The dyestuff is separated and worked up in the usual manner. It dyes wool with chromium mordants black tints of a very good fastness.

Claims granted include the following:

The herein described new orthooxyazo dye being in the shape of alkali metal salt a dark powder soluble in water to a reddish violet solution from which an inorganic or organic acid separate a yellowish red precipitate, the aqueous solution becoming red violet by addition of sodium carbonate, red by addition of sodium hydroxide, yielding upon reduction 8-chloro-2-amino-1-oxynaphthalene-5-sulphonic acid and 2,4-di-

amino-6-chloro-1-oxybenzene derivative, dyeing on wool with chromium mordants black tints and corresponding as free acid to the formula:



#### Cloth Plaiting or Piling Machine

(1,408,083; February 28, 1922)

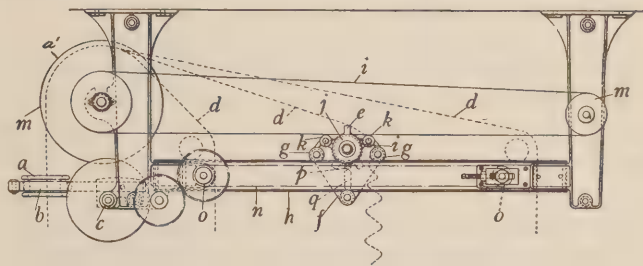
ALBERT DUROT, Manchester, England (assignor to James Farmer & Sons, Ltd., Salford, Manchester)

Inventor states that heretofore it has been proposed to plait or pile cloth in rope form by passing it through a guide-eye traversed back and forth across and over a winch reciprocated both along and across the machine.

The object of this invention is to provide an improved construction of piling machine, and it consists in the combination with a guide-eye cross-traversed by a continuously rotating right and left hand screw and supported independently of the winch carriage, of a winch extending the full width of the machine and having a reciprocatory movement imparted thereto by endless moving chains carrying lugs projecting into elongated slots in the winch carriage, the cloth from the guide-eye passing over a drawing roller or drum on its way to the winch.

The drawing is an end elevation of a cloth plaiting or piling machine constructed in accordance with this invention.

The cloth in rope form is passed through a pot or other guide-eye which is supported on an arm traversed back and forth across the machine in the known



manner by a right and left hand rotating screwed rod.

The cloth from said guide passes over a drawing roller or drum to a winch which is of any usual form extending from side to side of the machine and adapted to give the cloth rope as it descends therefrom a wave-like motion for piling purposes. The winch carriage or frame runs on rollers upon suitable rails or angle irons and the winch is rotated by a belt running round the winch pulley over tension rollers on the winch frame and over pulleys, one at each end of the machine.



The longitudinal traverse or reciprocation of the winch frame is effected by two endless chains running over sprocket wheels supported by the rails or angle irons aforesaid. A lug-like part projects from each chain and each lug enters an elongated slot in a side member of the winch frame.

Thus, as the chains are moved they carry the winch frame with them. As the lugs pass round the chain sprocket wheels they move along the slots aforesaid, either rising or falling in same, and so come into position to move the frame in a reverse direction.

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### Process of Dyeing

A process of dyeing unbleached cotton material is described in a recent British patent granted to the Surpass Chemical Company, Inc., Albany, N. Y. The process is primarily adapted for use on unbleached knitted cotton goods, or yarns from which it is desired to remove moths, shives or leaf, and dye the material in the same bath. According to the process described by a prior patent, the material was first dyed and then treated for speck removal, but in the later process the material is first dyed, and then in the same bath is treated with an alkaline oxidizing agent which, it is claimed, removes the specks, moths, shives, leaf and like impurities without adversely affecting the dye.

The alkaline oxidizing agent for the bath is preferably composed of about one-half each of peroxide of sodium and an alkaline sodium salt, and is used in the proportion of about 3 per cent of the weight of the goods under treatment. It has been found that sodium peroxide gives more satisfactory results than other oxygen-liberating products, because when sodium peroxide is subjected to decomposition in the bath, and upon the release of its oxygen, it generates sodium hydroxide, which is strongly alkaline—a condition of the bath which is necessary to the complete success of the process, and to shorten the time required for removing the moths, shives, leaf, etc.

The procedure for carrying out the dyeing process is as follows: The cloth is run into the dye machine, wetted out, the necessary dyestuff added to the bath, and the bath brought to a boil and boiled for ten minutes; 5 per cent or more of common salt is added, and the bath boiled for thirty minutes. Steam is then shut off, and the necessary amount of the alkaline oxidizing agent is added to the bath, and the goods are allowed to run thirty minutes without steam. Steam is then turned on, and the bath brought to a boil and continued there for fifteen minutes. Steam is again turned off and the goods allowed to run in the bath without steam for thirty minutes. The goods are then rinsed and the liquid extracted therefrom.

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Conferences between duck manufacturers and users and officials of the Bureau of Standards are likely to result in the adoption of national legislation standardizing the width of cotton duck, it is said.

### NOTES OF THE TRADE

The Locke Cotton Mills, Concord, N. C., are to build a new dyeing plant at their mills in Lockē, N. C.

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Conversion Products Corporation has been incorporated at Wilmington, Del., with a capital of \$100,000, to deal in dyestuffs, by John J. Doeley, George W. Study, Lester C. Burlett New York. Incorporated by United States Corporation Company.

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The Southwest Chemical Company, Dallas, Texas, has been incorporated, with a capital of \$10,000. The incorporators are J. William Morrow, M. G. Harris and J. F. Harrington, all of Dallas.

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Lichtman Textile Company, New York, has been incorporated to manufacture silk goods. The capital is \$500,000, and the incorporators are Irving Zisblatt, Paterson, N. J.; Leo Lichtman and Rose Rosenberg.

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Albert A. Lane, Inc., East Orange, N. J., has been incorporated to manufacture silk and other fabrics. The capital is \$100,000, and the incorporators are Harry H. Picking, F. E. Lynch and M. J. Deremer, all of East Orange.

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The American Textile Soap Company, Springfield, Mass., has incorporated the business under the same name, with a capital stock of \$100,000. The incorporators are Robert F. Warren and Charles A. Stone both of this city, and Albert F. Alstrom of West Springfield, Mass.

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Many uses have been found for raw or dehydrated coal tar, states W. W. Odell, fuel engineer of the United States Bureau of Mines, in Technical Paper 268, just issued. In fact, these are so numerous that there is no longer an excuse for throwing tar away or disposing of it wastefully. Some of the uses for tar and preparations in which it is employed are as follows: Timber preserving, fuel, tarred felt, paint for stone, brickwork, and iron, road-construction material and road-dust settler, waterproofing compounds for cement and for roof paint, germicides, and miscellaneous special preparations.

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Soleliac Silk Company, Allentown, Pa., has leased space in the Ocurto mill building, and is to install machinery for the manufacture of silk fabrics, principally linings. Recently, 100 looms and complementary machinery was purchased from the Widmer Silk Company, and this equipment has been installed in the new plant. The Soleliac Silk Company was formed a short time ago with E. A. Soleliac and James Kingston as the principal owners.

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

*Advisory Editor*

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*Managing Editor*

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No. 11

## WELCOME TO THE KNITTING ARTS EXHIBITION

**B**Y a happy combination of circumstances, several branches of the industry are this year co-operating to make the Knitting Arts Exhibition a real business stimulant from start to finish, in all branches and angles. The immense floor area of the Museum Building offers a striking opportunity for the event to fully reflect the importance and magnitude of this branch of the industry, and the contemporary Convention of the National Association of Hosiery and Underwear Manufacturers assures at all times a large and interested attendance. Managers of the Exhibition declare the present showing will eclipse previous successes. Those who will make use of the educational and business opportunities offered during the present week, will be amply repaid for their discernment and energy. Those who fail to recognize its latent potentialities will have only themselves to thank for wasted time. A glance around the hall should make it obvious that here, and now, is a time for renewing old connections and forming new ones, for gaining friends and instruction, for comparison and interchange of ideas and methods, and for co-operating to the end that the good effects of the present Exhibition may be felt throughout the entire year.

The AMERICAN DYESTUFF REPORTER, from its booth in the exposition hall, is glad to join with other exhibitors in welcoming you to the Show. We ask that you make our headquarters your own whenever you so desire, and extend our cordial invitation for you to make free use of such facilities as we have to offer for rest, appointments, or the exchange of trade news. We shall be glad to have you "drop in" at any time in the assurance that you will be welcome.

## THE CHEMICAL SHOW IS COMING

**C**OINCIDENT with the opening of the Knitting Arts Exhibition comes the first announcement in reference to the forthcoming Eighth National Exposition of Chemical Industries, which will be found elsewhere in this issue. Having tried the Eighth Coast Artillery Armory, the Bronx, in 1921, and having found this superb hall decidedly unpopular because of its location—though not on account of its facilities—the Chemical Show finds itself by common consent back again at the scene of its former successful exhibitions, the Grand Central Palace. The date of the Show is set for the week of September 11 to 16, inclusive, and will follow on the heels of the American Chemical Society's Fall meeting.

The interests for industrial chemistry in the Exposition are wide and varied: from raw materials in minerals, ores, manufacturing crudes or by-products, through the range of machinery, apparatus and equipment and instruments for control, precision, recording, gauging and measuring, and a thousand other items used in converting the raw materials into the finished products. The finished products themselves, whether they be organic, inorganic, solid, liquid, gaseous, or of any other form, are all to be there. Many new things upon which manufacturers were working when the war ended and which have been more leisurely perfected since will be shown for the first time. Industrial progress continually calls for greater advancement and perfection in manufacture, and each year sees many notable improvements upon the exhibits in the Exposition. Counting only these, the time of technical and business men is well spent in inquiring into the exhibits. One exhibitor, who for the past few years has been devoting time to the perfection of a new form of apparatus, said the other day that it is now when men have time to spare for consideration of these things that he expects a considerably larger and more interested attendance in his booth.

The managers report that three full floors of the Grand Central Palace are already taken for the Exposition and a part of a fourth. They expect all space will be engaged before the opening date. Already, 303 exhibitors have contracted for space.

It is as yet too early to give space to a detailed consideration of the character of the individual exhibits, but it is not too early to give thought to the importance of this affair, the magnitude and country-wide influence of which continues to grow from year to year. "Raw Materials, Machinery, Products" is the descriptive "catch-line" chosen to be featured in connection with the Show, and it is needless to say that new things of interest will be displayed under each of these three classifications.

You who are attending the Knitting Arts Exhibition should not fail to plan, now, for an attendance at the Chemical Show, either as exhibitor, purchaser, or seeker after up-to-date information concerning a group of industries which are found to affect you in some manner, no matter what your occupation or interests.



## FAREWELL TO THE DYE INVESTIGATION

**A**LTHOUGH hearings had been resumed for a brief period at the present writing, the King dye monopoly investigation was practically over, and as each witness had completed his testimony the fact was more forcibly and increasingly evident that the domestic dye industry had been completely vindicated. Seven weeks were consumed in the hearings, and thus far not one person who has testified before the committee has shown that any monopolistic tendency exists. Importers, manufacturers, and users of dyes have all appeared, and each in turn has testified that there is no monopoly of any kind. Even the small producer has failed to appear and testify to the existence of a monopoly.

The second item that the committee was charged to investigate was the question of lobbying. There has been no testimony that there has been lobbying, nobody has defined lobbying, and apparently there has been no attempt to prove that there has been lobbying. Senator Shortridge, chairman of the investigating subcommittee, repeatedly announced that if anyone had any evidence, or wished to ask any questions relative to lobbying or monopoly, he was free to appear and question the witness or the committee. Yet no one appeared to propound such questions—not even Senator King himself, who thereby forfeited his claim to serious attention in the future when speaking upon this subject.

Yet, in the face of his refusal to cross-question witnesses representing the very firms against which he has been hurling charges, both in the Senate and at the hearings, the Utah legislator again had the assurance to renew these attacks at the debates over the Fordney tariff which were begun toward the end of the investigation.

He continued to deal in large figures. He declared, for instance, that concerns like the Powers, Weightman & Rosengarten Company, Inc., and Parke, Davis & Co. have "derived enormous profits in their business." The last named company, he said, had not sought tariff rate increases. One of the beneficiaries of the bill, declared Senator King, would be the Union Carbide & Carbon Corporation, with \$225,000,000 capital. This bill "will put millions of ill-gotten gains, wrung from the pockets of the poor, into the coffers of this gigantic corporation," said Senator King, and continued:

"There is the Sherwin-Williams Company, which is to be benefited by this bill. Its assets are \$42,942,067. Is that an infant industry? It has to do with the paints and the varnishes that go to the farms and homes of the people. When we want building prices to come down, and when we are seeking the adoption of a policy which will enable men and women to secure homes, we are now by this bill making it more difficult for them to do so. We swell the mighty fortunes of the Paint Trust and the Varnish Trust and the other trusts, some of which are ancillary to the Sherwin-Williams Company, with its enormous capital.

"The Grasselli Chemical Company is to be benefited by this bill. It is one of the organizations that has had its

representatives here for months clamoring for increased rates. Its capital is \$40,000,000.

"The Mathieson Alkali Works has a capitalization of \$12,266,369.

"The Monsanto Chemical Works has a capitalization of \$10,242,660.

"The Merrimac Chemical Company has a capitalization of \$7,825,029."

He also wanted to know, of course, if E. I. du Pont de Nemours & Co., which he said manufactured many drugs and chemicals and had a capital of \$253,000,000, was "an infant industry" to be protected not only by high rates but in some cases by an embargo.

"The Allied Chemical & Dye Corporation, with a capital of \$300,000,000, is one of the chief beneficiaries under this schedule," he stated. "This stupendous octopus that sends its tentacles into the homes of the people throughout this land is a demander of high rates and even an embargo on some of its products."

The capital of the combined American chemical industries, according to Senator King, is \$5,200,000,000—but he neglected to say just what percentage of this astonishing figure is invested in the dye industry.

And so forth, with all his usual vigor. It is strange that even more of the general public has not, by this time, penetrated the Senator's methods. Perhaps it is because not enough of them have paid sufficient attention, but at all events, there is no longer any doubt as to his status among his confreres, among whom he stands forth as a phrase-maker, an orator of endurance and considerable ability—a spell-binder, if you will—but not to be held to strict accountability for statements made in connection with this subject.

A far saner and less biased viewpoint is displayed by one of the representatives of what may be referred to as "the other side." At the final session of the hearings. Dr. Samuel Isermann, president of the Chemical Company of America, admitted that some dyes manufactured in the United States can be protected by the tariff, but only a few of them can be thus protected. Most of the dyes, he told the committee, need an embargo.

The small dyestuff manufacturers of the United States. Dr. Isermann said, have helped to build up the dyestuff business. While the larger manufacturer has taken the line of least resistance, the small manufacturer has experimented with refinements.

There is no difficulty in getting vat dyes from abroad to-day, Dr. Isermann said, and he pointed out that the present imports in the United States of vat dyes are greater now than they were in 1914. He agreed that at times there is some trouble in obtaining licenses. He pointed out, however, that in March of this year between 350 and 400 licenses were issued to bring dyes from Germany, Switzerland and other countries.

He told the committee that there is an overproduction of certain kinds of dyes in the United States, while there is a shortage of others. He said that with proper legisla-

tion even the small dyestuff manufacturer should be able to obtain financial support.

There one finds a far better summing up of the situation by one who would of necessity have the greatest reason to complain if Senator King's monopoly charges were true. Dr. Isermann speaks, with specific authorization, for the many smaller manufacturers of coal-tar products in this country, and it is these and not Senator King who have something real at stake, and who might logically be expected to speak their minds with great freedom if they were being threatened by existing or proposed legislation.

One is impelled to hark back to a remark made before the start of the investigation by Senator Brandegee, who declared, "An investigation of the King proposal will not amount to anything." Others, supporting Senator King in his charge that a monopoly exists, added that they did not believe such an investigation would disclose anything new.

Which was to say that the investigators would be unable to prove the presence of a monopoly in the American dye industry and that the taxpayers' money would be frittered away on just one more futile project.

Those supporters of Senator King who did not favor an inquiry maintained that what had gone before was conclusive.

It is. They have openly charged, rather loosely it has seemed to *THE REPORTER*, that the American dye industry is a "huge trust," seeking to take advantage of the industries depending upon dyes for their successful operation and competition with foreign firms. They have made these charges with an air of uttering an axiom; they have striven to interlard their speeches with careless references to the "dye trust" and the "dye monopoly" in such a manner as to inspire the belief that the existence of this monster was something universally understood and agreed upon from the beginning—so patent, in fact, that its actual demonstration would be superfluous.

This has most conveniently spared them the necessity of submitting proofs. It is an ancient artifice, but it is still tried from time to time. Nevertheless, they have submitted nothing whatever during the various hearings to show that they have the slightest provocation for their bored and presumptuous way of branding the dye industry as a monopoly; while, on the contrary, excellent evidence has been produced to show that this label is a false one.

That is the conclusive part of past discussions.

Small wonder, then, that some would not unduly exert themselves to bring about an investigation which would put these assertions to the proof. It is about time this nonsense was dropped out of the dye problem, once and for all. There has been sensation-mongering enough, and both dye manufacturers and dye consumers the country over are heartily sick of it. To consume three whole years in determining upon a plan of action, as the Senate has succeeded in doing, is little short of disgraceful. The simple matter of deciding how much protection the dye industry ought to get has degenerated into a farce.

## TEXTILE ALLIANCE ISSUES BULLETIN NO. 40, OF REPARATION COLORS

Consumers of dyestuffs are in receipt of Bulletin No. 40, just issued by the Textile Alliance, Inc., from its headquarters at 45 East Seventeenth Street, New York City, containing the latest revised list of German colors available through Reparation sources.

In a special note by the Alliance it is explained that frequent changes—usually downward—are occurring in the prices of dyes from Germany. These changes not only affect the cost of the dyes abroad, but also the duty to be paid upon their importation. The publication of prices at this time, therefore, would not be useful and might prove misleading and injurious to American consumers, who are urged by the Alliance to advise that organization of their needs as they arise and obtain the prices in effect at that time. On such occasions, prices quoted will be for dyes in original containers, f. o. b. warehouse at Long Island City, N. Y., all charges paid unless otherwise stated.

The dyes listed are "without guarantee" but are offered upon the representation of the German Government that they are of standard pre-war quality.

The offerings included under the various classifications are supplied by the following firms: Direct Cotton Dyes, by Bayer, Cassella, Badische, Berlin, and Kalle; Direct Dyes Diazotized and Developed, by Bayer, Cassella, Meister Lucius & Bruning, and Berlin; Acid Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, Berlin, and Kalle; Chrome Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, and Berlin; Basic Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, and Berlin; Alizarine Dyes, by Bayer, Badische, and Meister Lucius & Bruning; Vat Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, and Kalle; also other dyes by Griesheim and Mulheim, including Developer B, by Bayer.

## 1922 FALL SEASON COLOR CARD, HERE, SHOWS EIGHTY COLORS

The Textile Color Card Association of the United States, Inc., has just released for general distribution to the trade the 1922 Fall Season Color Card of America. This is the authoritative forecast for fashionable colors, used by all branches of industries and trades. It contains eighty colors, sixty-six of which are portrayed in silk and twelve in woolen fabric. Twelve shoe, leather and hosiery shades are featured under separate grouping.

As America's color arbiter, the Association presents an imposing array, resembling all the rich burnished tones of autumn foliage, with virile hues much in evidence. Exotic greens and yellows, reds, blues and orange reflecting the present Oriental and Russian influence of the mode, are prominent, in a group of evening shades, such as Poinsettia, Chinese Green, Celestial, Golden Glow and Egplantine.

A distinctly new type of smart tans are descriptively named Muffin, Toast and Tiffin. An interesting feature



is the introduction of bright greens of Gaelic persuasion, called Killarney and Erin.

There is also a group of odd coppery greens of the Russian type named Kremlin, Samara and Narva. Bittersweet, a deep orange, and Brickdust, a rich copper-red, are two new shades of distinction. Grays are featured in both light and medium tones, such as Wood Ash, Fog and Lead. Purples are quite prominent—a range of beautiful violet tones are given ecclesiastical names, Nuncio, Pontiff and Vatican. Another range of purples are on the reddish tint, called Mallow and Cyclamen. Various new shades of brown, quite suggestive of the Far East are Spice, Ginger and Chutney, Rangoon and Mandalay.

Kashan is a deep turquoise, named after the famous Persian pottery. Ranges of deep oxheart reds, brilliant liberty blues, also soft firmament blues and deep sand shades are also offered. Periwinkle and cornflower blues, as well as light fuchsia shades from the Spring 1922 Card are again shown.

Of special interest among the woolen group is a novel tan shade called Pigskin. Apache and Tuscany are new browns with golden and reddish undertones. A distinctly new red is introduced, called Akbar. A deep wine shade is named Armada, and Dante is a very dark purple of slightly reddish cast. An exotic blue is called Hankow, and Gargoyle is a novel medium gray.

The shoe and hosiery colors feature Silver, Mist and Pigeon grays, also soft fawns, Otter and Mouse shades. Browns are much in evidence ranging from light golden to reddish dark Rembrandt shades.

#### **DU PONT ANNOUNCES SULPHOGENE GOLD-BROWN R AND DU PONT NAPHTHANIL SCARLET R BASE**

The Dyestuffs Department, Sales Division, E. I. du Pont de Nemours & Co., Inc., announce an addition to their line of Sulphur colors in a new product which they offer under the name of Sulphogene Golden Brown R.

The color is identical in all of its properties to their Sulphogene Golden Brown G. This new color is brighter and redder in shade than the "G" brand, however.

The offering is exceptionally soluble and therefore is useful in machine dyeing as well as pad and jig work. An aftertreatment will improve the fastness to light, perspiration, cross dyeing, acids and washing and the shade is reddened only very slightly.

The Du Pont forces are also placing on the market and completing their present line of colors in the Naphthanil series by offering Du Pont Naphthanil Scarlet R. Base.

This base is used either with the Du Pont Naphthanil AS or BS for producing brilliant yellowish pinks or vivid reds. The shades obtainable from this product possess the same fastness qualities as those produced with the Du Pont Naphthanil Scarlet G Base.

With this new addition, it will complete a range whereby the consumer should have no difficulty in obtaining

any desired shade of reds or pinks, to meet with the demands of the cotton industry.

Detailed information as to the above products may be obtained at any of the company's branch offices.

#### **S. O. C. M. A. ELECTS OFFICERS FOR YEAR; DR. HERTY CONTINUES AS PRESIDENT**

Officers elected by the Synthetic Organic Chemical Manufacturers Association of the United States at its first Annual Meeting at the Hotel Pennsylvania, were as follows:

President, Chas. H. Herty; Vice-Presidents, Dyestuff Section, C. N. Turner, New Port Chemical Works, Passaic, N. J.; Intermediate Section, Chas. A. Meade, E. I. du Pont de Nemours & Co., Wilmington, Del.; Pharmaceuticals Section, Herman Seydel, Seydel Manufacturing Company, Jersey City, N. J.; Fine Organic Chemicals Section, P. Schleussner, Roessler & Hasslacher Company, New York City; Treasurer, Donald McKesson, McKesson & Robbins, New York City. Board of Governors: Vice-Presidents, *ex officio*; August Merz, Heller & Merz, Newark, N. J.; F. P. Summers, Noil Chemical & Color Works, New York City; S. Iserman, Chemical Company of America, New York City; F. E. Signer, Butterworth-Judson Corporation, New York City; W. T. Cashman, Grasselli Chemical Company, Cleveland, Ohio; S. W. Wilder, Merrimac Chemical Company, Boston, Mass.; A. S. Burdick, Abbott Laboratories, Chicago, Ill.; Donald McKesson, McKesson & Robbins, New York City; F. L. McCartney, Monsanto Chemical Works, St. Louis, Mo.; James T. Pardee, Dow Chemical Company, Midland, Mich.; Charles H. Herty, *ex officio*.

Arthur D. Holmes, research chemist Jackson Laboratory, E. I. du Pont de Nemours & Co., has resigned to establish a research laboratory for E. L. Patch & Co., Boston, Mass.

To the end that scientific research may be furthered, plans have been formulated for co-operation between representatives of the different divisions of the textile industry and the Bureau of Standards. Committees will be appointed in the wool, worsted, cotton, silk and associated divisions to co-operate with officials of the bureau in conducting research tests and experiments. These committees are to be named in conjunction with the leading trade organizations, and a series of conferences will be held preliminary to a joint conference next fall.

Horn Manufacturing Company, Greensboro, N. C., recently organized, is installing equipment for the manufacture of carpets and rag rugs. Rags will be purchased from cotton mills and converted into rugs and carpets. The president of the company is S. B. Tanner, well-known cotton manufacturer of the South, and associated with him are S. E. Elmore, Carl Horn and C. B. Howard.

## **ROXFORD KNITTING CO. UNDER AUCTIONEER'S HAMMER; MACHINERY AND DYEHOUSE EQUIPMENT IN SALE**

Announcement has been made by Samuel T. Freeman & Co., 1519-1521 Chestnut Street, Philadelphia, auctioneers, of a receivers' sale in equity of the plant, real estate, machinery and equipment of the Roxford Knitting Company, located at Randolph and Jefferson Streets, that city. This sale will be held at 10 o'clock A. M. each day on the premises, Thursday and Friday, June 8 and 9. Full particulars may be obtained from the auctioneers.

Among the effects to be disposed of will be machinery and equipment comprising 107 Wildman and Scott & Williams Latch Needle Body Knitters 13-24 inch, 250 Crane, Campbell & Clute and Tompkins Body and Balmoral Knitters 10-24 inch, 29 Copper Spring-Needle Body and Cuff Knitters 17-22 inch, 10 Tiffany 5-Band Cuff Knitters, 35 Allen & Payne Bobbin Winders, Davis & Furber Fleecer, 25 Finishing Machines, Calendar Machine, 550 Sewing Machines, including Singer, Union Special, Metropolitan, Merrow, Willcox & Gibbs and Union Button and Buttonhole, Embroidery, Flat-Lock, Twin-Needle, Seaming, Welting, Shaping, Lock-Stitch, Single and Double Needle Machines, Eyelet and Stamping Machines, 10 Eastman, Ballard and Naiman Electric Cutters, 6 Crawford Hydraulic Hot-Plate Presses. Also Paper Box Plant, comprising Slitting, Covering, Rewinding, Edging and Corner-Cutting Machines, Brown & Carver Paper Cutter, etc. Also Dyehouse Equipment, comprising 12 Dyeing Machines, 7 Shamm & Uhlinger 50-inch and 55-inch Extractors, Steel Keers, Davis Cleaner, Dye and Soap Tubs, Tanks, etc. Also Complete Printing Shop, including 2 Presses, Type, etc. About 500 Box Trucks, 500 Chairs, about 250 Seats, Steel and Stock Shelving, 100 Pine Stock Tables, Benches, Partition, etc. Also 120 General Electric and Diehl Motors from 3 to 10 H.-P., Drill Press, Lathes, Platform Scales, Time Clocks, Shafting, Belting, etc. Office Furniture, including about 7 Royal, Remington and Underwood Typewriters, International and Burroughs Adding Machines, Billing Machines, Dictaphones and Addressographs, Oak and Mahogany Flat-Top and Typewriter Desks, Oak and Steel Letter and Card Index Filing Cabinets, Safes, Office Chairs, Partition, Trade Marks "Roxford" and "Florine," Advertising Cut-Plates, Printed Box Tops, miscellaneous advertising material, woven labels; also credit files and list of customers.

## **W. H. CADY LEAVES U. S. FINISHING COMPANY**

Shortly before going to press news reached The REPORTER that William H. Cady, who has for several years acted as chief chemist for the United States Finishing Company, making his headquarters at its Silver Spring Branch, Providence, R. I., has severed his connection with this concern. Mr. Cady, with his customary reticence, declined to discuss either the occasion for his leav-

ing or his plans for the future, other than to admit that the latter were indefinite.

Mr. Cady has long been a prominent figure in the field of color application. For several years prior to his acceptance of the position with the United States Finishing Company he had been associated with the Badische Company and has been generally recognized by textile colorists as an authority on all color application questions. He has been extremely active in the American Association of Textile Chemists and Colorists, of which he is a vice-president, and for the organization of whose Rhode Island Section he was responsible.

The REPORTER wishes Mr. Cady all success in whatever future connections he may establish and feels sure that the concern which is fortunate enough to secure his services is to be sincerely congratulated.

## **PREPARATIONS NOW UNDER WAY FOR EIGHTH CHEMICAL SHOW, AT GRAND CENTRAL PALACE**

The Eighth National Exposition of Chemical Industries will be held this year in the Grand Central Palace, New York City, during the week of September 11 to 16, inclusive. It will follow immediately upon the Fall Meeting of the American Chemical Society. "Raw Materials, Machinery, Products" is the featured line describing the Exposition this year, and the affair is intended to carry this main impression. The raw materials are exhibits of the natural resources from out of the earth and above the earth. The machinery exhibits consist of apparatus and equipment and instruments for control, precision, recording, gauging, measuring, and machinery for every mechanical operation in the manufacture of products from the raw materials. The products themselves are the finished products and the exhibits will contain those of organic, and inorganic origin, of solid, liquid, or gaseous form, and of every conceivable nature. Many new things upon which manufacturers were working when the war ended, and which have been since more leisurely perfected, will be shown for the first time. Industrial progress continually calls for advancement and progress in manufacture, and each year we have many notable improvements in the exhibits at the Exposition.

Counting only these; the time of technical and business men is well and advantageously spent in inquiring into the things on exhibit. One exhibitor, who for the past few years has been devoting time to the perfection of a new form of apparatus, said the other day that now, when men have time to spare for consideration of these things, he expects considerably larger and more interested attendance at his booth. "When the plants are idle as they are now the most progressive companies are examining into our apparatus, and a remarkable thing is that we are making some installations in plants which are now closed, so that when they begin their work they will be in a better position than ever and have an advantage in taking this opportunity to prepare to reduce their costs



for the future. I'm looking for many more such openings through our exhibit and with considerable enthusiasm for the entire Exposition."

The managers report that three full floors of the Grand Central Palace, and part of the fourth, are already taken for the Exposition. There are at this time 350 exhibitors who have contracted for their space locations. In the Exposition there are two special sections, one upon the subject of Fuel Economy, where exhibits intended for the more efficient use of fuel, its combustion, distribution or control, will be made; the other where the subject of shipping containers will be given considerable attention and will have to do with the container itself, whether of metal, wood, fiber, paper or the cooerage of slack or tight barrels, tanks and towers with machinery for packaging, labeling, handling and conveying the packaged material and, lastly, making it ready for final shipment. This section will furnish the complete ideal for any industrial plant. There will be groups of exhibits of glass and ceramic products. Laboratory equipment will be thoroughly represented. There will be a group of Canadian exhibits where the natural resources of the adjoining Dominion will be made and there will also be a Southern Section where not only the resources of our South but of the manufactured products coming from that section will be made.

The program of the Exposition has been outlined and work is now in progress upon it, and it may be expected to compare fully with the high standards of the preceding Expositions. As has been the custom, there will be exhibits of motion pictures covering all phases of the chemical industries and the Exposition will hold many interests for every visitor.

The office of the managers, Charles F. Roth and Fred W. Payne is in the Grand Central Palace, New York City, and inquiries should be directed to them there.

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The New York Color & Chemical Company has leased space in the new building at 12 Gold Street, that city.

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To keep up with their increasing business in the New York district the Germantown Dye Works, Germantown, Pa., have opened an office at 441 Broadway. W. W. McWhinnie, formerly with the Viscose Company, is in charge of the new office.

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Charles F. Hobson, formerly general manager, Westchester Chemical Company, Pelham, N. Y., is now with the Wamesit Chemical Company, Lowell, Mass.

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The British Cellulose & Chemical Manufacturing Company reports a loss of £1,099,305 for the fiscal year ended with June 30, 1921. The common stock has been reduced from £2,300,000 to £1,150,000.

The American Dyes Institute, dating from May 1, has given up its office in the Bush Terminal Building, and hereafter mail sent to that organization will be forwarded to the Synthetic Organic Chemical Manufacturers' Association, 1 Madison Avenue. While the Dyes Institute and Synthetic Association are two separate bodies, most of the members of the former are also members of the Association, and the two organizations have always co-operated in working for the dyestuff industry. It is not expected that the Dyes Institute will be broken up, but will simply cease to function.

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Dr. Theodore W. Doell, formerly with the du Pont organization, is director of the Industrial Chemical Laboratories, Oakland, Cal., recently established to engage in consulting research and analytical work.

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John F. Queeny, chairman, board of directors, Monsanto Chemical Works, St. Louis, Mo., completed on March 28 a half century of activity in the chemical industry.

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Morris Knitting Mills, Brooklyn, N. Y., with mill at 1329 Myrtle Avenue, are building a new mill on De Kalb Avenue. The latter plant will be three stories, and will be built at a cost of approximately \$40,000. The architect is Henry J. Nurick, 44 Court Street, Brooklyn.

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
**AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS**

VOLUME X

JUNE 5, 1922

NUMBER 12

## GEIGY COMPANY, Inc.

89-91 Barclay Street, New York City

### *ANILINE COLORS*

Gentlemen:—

Since it is not possible for us to know your every requirement in your dyeing department, we wish you to feel that you can call upon us at any time for information.

When we sell you goods, our interest does not end there; on the contrary, it is our highest aim to render you the continuous service due you, and we are ready at all times to do so, if you will permit us.

If there is any information you desire regarding the characteristics of our various colors, you have but to call upon us, and you may rely upon a ready response.

We have practical men whose knowledge and service are at your disposal; you have only to avail yourself of their assistance.

Are you confronted with any problems now? If so, we shall consider it a privilege to demonstrate our ability and usefulness to you.

Let us know how we can best serve you.

Faithfully and cordially yours,

Geigy Company, Inc.

"Service Department"

Sole Selling Agents for J. R. GEIGY S. A., Basle, Switzerland

Established 1764

Main Office J. R. Geigy S. A., Basle, Switzerland; in Great Britain  
The Geigy Colour Co., Ltd., 35-37 Dickinson St., Manchester

BOSTON

PROVIDENCE

PHILADELPHIA

TORONTO

COLUMBUS, GA.





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# AMERICAN DYESTUFF REPORTER

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Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

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## The After-Chroming of Wool

The Results of an Investigation to Determine the Influence of the Nature of the Negative Ion on the Mordanting Process—Present Scope Limited to the After-Chroming Process

By ALAN A. CLAFLIN

*L. B. Fortner Company, Boston, Mass.*

IN mordanting with compounds of chromium, the bichromate of soda is the salt which is by far the most widely used. This is true whether the mordanting takes place before or after dyeing. Since bichromate of soda is the source of most of the other chromium salts, in all probability it will continue to find the widest employment. There are occasions, however, when it is desirable to use for mordanting a salt of chromium in which the chromium is present in the form of a base—i. e., as the positive ion as distinguished from compounds like the bichromates, where the chromium is present as an acid, or negative, ion.

### PRESENT USES OF CHROMIUM SALTS

At the present time the use of the salts of chromium—and for the purpose of clarity it may be here stated that the term "salt of chromium" will be understood to mean a salt where the chromium is positive—is confined principally to the after-chroming process or for wool printing, both Vigoureux and fabric. For wool printing it is essential to use a chromium salt instead of a bichromate, as so powerful an oxidizing agent as a bichromate is incompatible with the organic thickening agents in the printing paste. Further, in the high concentration necessary it would destroy most of the colors. In after-chroming, chromium salts are used where the bichromates seriously throw the shade. There are not a great many colors where such is the case; in fact, in many dyehouses no salt except a bichromate is ever used. In other dyehouses, however, chromium fluoride, chromium acetate or chromium sulphate is used when occasion requires.

It is also entirely possible that preliminary mordanting may eventually be done with a salt of chromium. In chrome tanning, which in many ways is analogous to chrome mordanting, the whole modern tendency is toward the use of a chromium salt.

### PURPOSE AND SCOPE OF INVESTIGATION

In view of the present occasional use, therefore, of chromium salts, and possible greater prospective use, it has seemed desirable to conduct an investigation to determine if in a chromium salt the nature of the negative ion has any influence on the mordanting process.

So far this investigation has been limited to the after-chroming process.

The salts of chromium which have been investigated are:

Chromium acetate  
Chromium chloride  
Chromium fluoride  
Chromium nitrate  
Chromium oxalate  
Chromium sulphate

These salts were used in quantities which were equivalent to each other, and further, for purposes of comparison tests, were made with an equivalent amount of bichromate.

The colors selected for the tests were of types considered as representative, and are as follows:

Alizarine Yellow 2GO  
Acid Anthracene Red 3B  
Chloramine (Diamine) Fast Red F  
Carmoisine Conc.  
Acid Anthracene Brown FW  
Acid Alizarine Blue SKY  
Acid Violet 6RN  
Acid Alizarine Green CG Extra

With some of these colors—e. g., Carmoisine, Brown FW and Violet 6RN—the oxidizing action of bichromate is apparently essential to develop the shade.



The tests were made on 10-gram skeins of worsted yarn. The after-chroming was done in the same bath in which the dyeing took place. The percentages of chromium salt taken were the quantities which the particular samples of salts used were equivalent to the percentage of bichromate; in most cases the percentage does not correspond to the chemically pure chromium salt.

After the skeins were dyed, the fastness to scouring was tested by the following method: A standard portion of each skein was braided with white woolen cotton and silk yarn. These braided skeins were steeped for sixteen hours in a solution containing 5 grams of neutral soap and 2 grams soda ash per liter, then this solution raised to 140 deg. Fahr. and the skeins rubbed on a board until felted.

#### ALIZARINE YELLOW 2GO

The results obtained are as follows: Alizarine Yellow 2GO. This is a very pure, highly concentrated form of the well-known dyestuff obtained from meta-nitro-aniline and salicylic acid.

##### *Dyeing Recipe*

1. Two per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid; boil one-half hour, rinse and dry. This will be termed the "acid" dye.
2. Same, except at the end of one-half hour 1 per cent of bichromate of soda was added. This will be termed the "bichromate" mordant.
3. Same, except 3 per cent of chromium acetate was used in place of the bichromate.
4. Same, with 1.7 per cent chromium chloride.
5. Same, with 2 per cent chromium fluoride.
6. Same, with  $3\frac{1}{4}$  per cent chromium nitrate.
7. Same, with  $3\frac{3}{4}$  per cent chromium oxalate.
8. Same, with 4 per cent chromium sulphate.

1. *Acid Dyeing*.—The acid dye gave a clear deep lemon-yellow shade; when scoured, a large portion of the color was removed; the white wool and silk considerably stained; the cotton unstained.

2. *Bichromate*.—With bichromate the shade is made much browner. Scouring test: Shade holds original depth; wool, cotton and silk unstained.

3. *Chromium Acetate*.—With chromium acetate the shade is considerably deeper than the acid dyeing, but not materially changed. Scouring test: Shade holds original depth; wool and silk slightly stained; cotton unstained.

4. *Chromium Chloride*.—With chromium chloride the shade is slightly browner than with chromium acetate, but much less changed from the acid dyeing than with the bichromate.

5. *Chromium Fluoride*.—With chromium fluoride the shade is slightly browner than with the chloride, but very much nearer that of the bichromate. Scouring test: Original shade not altered; wool and silk very slightly,

if at all, stained; cotton unstained. Resistance practically as good as with bichromate.

6. *Chromium Nitrate*.—With chromium nitrate the shade is almost identical with that of chromium fluoride. Scouring test: Shade is altered; but wool and silk very slightly—but perceptibly—stained.

7. *Chromium Oxalate*.—With chromium oxalate the shade the same as with the fluoride and nitrate. Scouring test similar, although a trifle better than nitrate.

8. *Chromium Sulphate*.—With chromium sulphate the shade is very close to that with the chloride; less brownish and not so deep as with the fluoride, nitrate and oxalate. Scouring test: Most nearly like the chloride, better than with the acetate, but not quite so good as with the fluoride, as the wool and silk are slightly stained.

#### ACID ANTHRACENE RED 3B

##### *Dyeing Recipe*

1. Three per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid; boil one-half hour longer; rinse and dry.
2. Same, with the addition of  $1\frac{1}{2}$  per cent bichromate of soda.
- 3, 4, 5, 6, 7, 8. Follow same order of mordants as with Alizarine Yellow.

1. *Acid Dyeing*.—Acid dyeing, full bright red shade. Scouring test: Silk considerably, cotton slightly, stained; wool unstained.

2. *Bichromate*.—With bichromate the shade is slightly dulled and somewhat bluer. Scouring test only slightly, if at all, better than acid dyeing.

3. *Chromium Acetate*.—With chromium acetate the shade is duller and weaker than the acid dyeing, noticeably weaker than with bichromate. Scouring test: Same as acid dyeing.

4. *Chromium Chloride*.—With chromium chloride the shade is brighter than with the bichromate or acetate. Scouring test: Same as acid dyeing.

5. *Chromium Fluoride*.—With chromium fluoride the shade is similar to that with chloride; brighter than with bichromate. Scouring test: Same as others; slightly, if at all, better than acid dyeing.

6. *Chromium Nitrate*.—With chromium nitrate the shade is similar to the preceding. Scouring test, likewise same.

7. *Chromium Oxalate*.—With chromium oxalate the shade is slightly bluer than preceding, more nearly like the acetate. Scouring test as others.

#### CHLORAMINE (DIAMINE) FAST RED F

##### *Dyeing Recipe*

Same as with Acid Anthracene Red 3B, using 3 per cent color. With bichromate,  $1\frac{1}{2}$  per cent was used, and equivalent proportions of other salts.

1. *Acid Dyeing*.—Acid dyeing, full brick-red shade. Scouring test: White wool unstained; cotton considerably and silk slightly stained.

2. *Bichromate*.—With bichromate the shade is very decidedly browned and dulled. Scouring test: Wool and silk unstained; cotton very slightly stained.

3. *Chromium Acetate*.—With chromium acetate the shade is only very slightly browner and duller than is the acid dyeing. Scouring test: Wool and silk unstained; cotton badly stained.

4. *Chromium Chloride*.—With chromium chloride the shade is similar to preceding, but a little bluer and fuller. Scouring test: White wool unstained; silk slightly and cotton considerably stained.

5. *Chromium Fluoride*.—With chromium fluoride the shade is practically as bright and a little deeper than acid dyeing. Scouring test: White wool and silk unstained; cotton slightly stained.

6. *Chromium Nitrate*.—With chromium nitrate, shade nearly as brown as with the bichromate. Scouring test: Same as preceding; cotton, if anything, less stained.

7. *Chromium Oxalate*.—With chromium oxalate, shade similar to that with chloride. Scouring test: Rather poor; silk slightly, cotton heavily, stained.

8. *Chromium Sulphate*.—With chromium sulphate, shade similar to oxalate, but slightly weaker. Scouring test: Similar to chloride.

#### CARMOISINE CONC.

##### *Dyeing Recipe*

1. Three per cent color, 10 per cent Glauber salt, 10 per cent sulphuric acid; boil one-half hour and add 3 per cent sulphuric acid.
2. Same as above, with the addition of 1½ per cent bichromate of soda.
- 3, 4, 5, 6, 7, 8. Same, except the other chromium salts are used in proportional amounts in the same order as in preceding test.

1. *Acid Dyeing*.—Acid dyeing, the shade a bright cherry red. Scouring test: Poor result; much of the original color removed and the cotton, wool and silk badly stained.

2. *Bichromate*.—With bichromate, shade a deep bluish violet. Scouring test: White wool and silk unstained; cotton stained slightly pinkish.

3. *Chromium Acetate*.—With chromium acetate, shade very similar to acid dyeing. Scouring test: Somewhat better than the acid dyeing, but wool, silk and cotton stained, the depth increasing in the order given.

4. *Chromium Chloride*.—With chromium chloride, shade and scouring test almost identical with the acetate.

5. *Chromium Fluoride*.—With chromium fluoride, same as preceding.

6. *Chromium Nitrate*.—With chromium nitrate, the shade a reddish violet. Scouring test: Nearly as good as the bichromate; the wool and silk, however stained slightly; cotton stained considerably.

7. *Chromium Oxalate*.—With chromium oxalate, same as acetate.

8. *Chromium Sulphate*.—With chromium sulphate, same as acetate.

#### ACID ANTHRACENE BROWN FW

##### *Dyeing Recipe*

1. Three per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid and boil one-half hour.
2. Same, with the addition of 1½ per cent bichromate of soda.
- 3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing*.—Acid dyeing, the shade of light yellowish brown. Scouring test: Original color slightly weakened; white wool stained faintly yellow; silk stained very slightly; white cotton stained heavily pinkish.

2. *Bichromate*.—With bichromate, a full plum shade of brown. Scouring test: Original color firmly held; white wool and silk unstained; cotton stained slightly pinkish.

3. *Chromium Acetate*.—With chromium acetate, shade similar to acid dyeing, but duller. Scouring test: Similar to the acid dyeing, except that wool and silk are less stained.

4. *Chromium Chloride*.—With chromium chloride, shade similar to the acetate, but a deeper and brighter brown. Scouring test: Same as acetate.

5. *Chromium Fluoride*.—With chromium fluoride, shade similar in tone to that obtained with the bichromate, but very much lighter. Scouring test: Similar to bichromate.

6. *Chromium Nitrate*.—With chromium nitrate, shade similar to fluoride, but very much duller. Scouring test: Similar to the fluoride.

7. *Chromium Oxalate*.—With chromium oxalate, the shade similar to that obtained with the fluoride, but a little weaker and brighter. Scouring test: Similar to fluoride.

8. *Chromium Sulphate*.—With chromium sulphate, shade similar to that with chloride. Scouring test: Same as with chloride.

#### ACID ALIZARINE BLUE SKY

##### *Dyeing Recipe*

1. One per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 1 per cent sulphuric acid, then boil one-half hour.
2. Same, with the addition of ½ per cent bichromate of soda.
- 3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing*.—Acid dyeing, the shade a clear sky-blue. Scouring test: The shade slightly weakened and brighter; white wool stained slightly bluish; silk stained



more heavily blue, and cotton stained slightly pinkish.

2. *Bichromate*.—With bichromate, the shade is considerably duller. Scouring test: About the same as preceding.

3. *Chromium Acetate*.—With chromium acetate, the shade about as bright as the acid dyeing. Scouring test similar.

4. *Chromium Chloride*.—With chromium chloride, same as preceding.

5. *Chromium Fluoride*.—With chromium fluoride, same as preceding, except slightly heavier.

6. *Chromium Nitrate*.—With chromium nitrate, same as preceding, except the shade is slightly duller and not so dull as with the bichromate.

7. *Chromium Oxalate*.—With chromium oxalate, same as acetate.

8. *Chromium Sulphate*.—With chromium sulphate, same as acetate.

#### ACID VIOLET 6RN

##### *Dyeing Recipe*

1. Three per cent color, 10 per cent Glauber salt, 10 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid, then boil one-half hour.
2. Same, with the addition of 1½ per cent bichromate of soda.
- 3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing*.—Acid dyeing, a bright red violet. Scouring test: Original shade considerably dull; white wool slightly stained; silk stained slightly bluish; cotton stained light violet.

2. *Bichromate*.—With bichromate, the shade a deep full blue, but somewhat dull. Scouring test: Wool and silk unstained; cotton stained slightly violet.

3. *Chromium Acetate*.—With chromium acetate, shade similar to the acid dyeing, but duller. Scouring test. Similar to bichromate, except silk is slightly stained.

4. *Chromium Chloride*.—With chromium chloride, similar to acetate.

5. *Chromium Fluoride*.—With chromium fluoride, the shade a full bluish violet. Scouring test: Similar to that with bichromate.

6. *Chromium Nitrate*.—With chromium nitrate, similar to the fluoride, but slightly bluer.

7. *Chromium Oxalate*.—With chromium oxalate, similar to the fluoride, but slightly redder.

8. *Chromium Sulphate*.—With chromium sulphate, similar to the acetate, but slightly duller.

#### ACID ALIZARINE GREEN CG EXTRA

##### *Dyeing Recipe*

1. Two per cent color, 10 per cent Glauber salt, 5 per cent sulphuric acid; boil one-half hour; add 2 per cent sulphuric acid, then boil one-half hour.
2. Same, with the addition of 1 per cent bichromate of soda.
- 3, 4, 5, 6, 7, 8. Same, with the other chromium salts.

1. *Acid Dyeing*.—Acid dyeing, the shade a clear, bright bluish green. Scouring test: The wool slightly and silk somewhat more heavily stained, with green cotton unstained.

2. *Bichromate*.—With bichromate, the shade slightly duller and yellower. Scouring test: Wool very faintly and silk slightly more stained green; cotton unstained.

3. *Chromium Acetate*.—With chromium acetate, the shade similar to the acid dyeing. Scouring test: Similar to that with the bichromate.

*Chromium Chloride, Etc.*—With chromium chloride, chromium fluoride, etc., similar results, both as to shade and resistance of scouring test, as with the acetate.

#### DISCUSSION OF RESULTS

The various dye and scouring tests make it evident that in the after-chroming process, results vary with different colors to a greater or less degree with the salt of chromium used.

In the main, all the salts of chromium change the shade less from that obtained in the simple acid dye than does the bichromate. The shades obtained with the various salts resemble each other more than they do those obtained with bichromate. Scouring tests with the various salts show in general an improvement in fastness, especially that obtained with the bichromate.

#### PROPERTIES OF WATER-GAS TAR

Water-gas tar has an entirely different origin from coal tar and, in addition, differs from coal tar both physically and chemically, states the U. S. Bureau of Mines. In appearance, however, it is much the same, except that it is much more fluid; that is, it has the consistency of water or oil. When a small quantity is rubbed between finger and thumb in a thin layer, it appears to be brown to black. Its specific gravity is very nearly the same as that of water, but when free from water the specific gravity may be as high as 1.15. Water-gas tar from small gas plants where the gas is produced intermittently varies more, both in composition and in physical properties, than in the larger plants where operation is continuous. Tars with specific gravities little greater than that of water (1.00) are not separated from water as readily as the heavier tars. Frequently water-gas tars are found that carry considerably more than 50 per cent of water. Such a fluid is, to be specific, an emulsion of tar and water, yet in appearance it is tar. Water-gas tar contains compounds known as paraffine, which are not present in coal tar. It is further distinguished from the latter by its not containing any appreciable amount of tar acids. Free carbon is seldom present in amounts greater than 1 to 4 per cent.

Alma Mills, Gaffney, S. C., have been incorporated with capital of \$600,000 to manufacture cotton yarn and cloth. The new company will operate the plant formerly occupied by the Cash Mills. W. C. Hamrick is president and treasurer of the new company.

# The Construction, Dyeing and Finishing of Homespuns

Great Variety of Effects Obtainable—Color Fastness to Milling and Washing Important—Bleaching for Brilliance—Recommended Dyestuff Types—Scouring, Milling and Fulling Processes—Little Finishing Necessary—Light Pressing Good Practice

By GEORGE E. TEMPLETON

*Superintendent of Dyeing and Finishing, Brook Woolen Company, Simcoe, Ontario*

**H**OMESPUNS have had a season of popularity which shows every indication of being extended into the coming fall and following spring. Inasmuch as the writer has been largely occupied with the production of this class of goods during the present season, it may be of interest to others in the profession to learn something of his experiences.

There is practically no end to the variety of color effects which can be obtained in mixtures, to say nothing of the number of shades which can be produced by piece dyeing, cross dyeing, etc. Mixtures of white wool with violet, light blues, greens, gold, light browns and pleasing shades of blue grays and certain reds have been most in demand. The fabrics are simple in construction—plain weaves predominating, although some have been made with basket weaves, but the latter are not generally as serviceable as the former. A majority of the better quality homespuns are made from a medium-grade wool ranging from 1,000 to 1,200 ends in the warp and from 16 to 20 picks per inch, of from 40 to 55 grain yarn, 20 yards basis. As this is an "easy" constructed cloth, it should be perfectly woven, with little mending, if any, required, and extreme care should be used when burling.

The colored wools used in blending should be dyed with colors fast to milling and washing and which are bright and snappy. The white wool used should be bleached, an operation which may be performed simply and inexpensively with the use of permanganate, bisulphite and sulphuric acid—a very excellent white being produced by this process.

## THE BLEACHING PROCESS

The wool which is to be bleached should be well scoured and evenly wet out, and then immersed in a bath containing from 3½ to 4½ ounces of potassium permanganate to every 10 gallons of water for from thirty to forty-five minutes. It is then drained and immersed in a fresh bath containing from 3½ to 4 ounces bisulphite, 64 deg. Tw., and from 4 to 6 ounces of sulphuric acid (concentrated) to every 10 gallons of water. The wool is worked in this bath for from one and one-half to two and one-half hours, or until such time as the brownish cast or stain left on the

wool by the permanganate has turned to a pure white; it is then thoroughly rinsed and extracted. Bleached wool when used in mixtures tends to make the effect more "lively." A comparison of two cloths made from the same mixture, in one of which bleached wool is used and in the other unbleached, will show a startling difference. One can therefore imagine the effect upon a buyer who may be comparing two cloths from different mills which show this difference.

## CHOICE OF DYESTUFFS

As previously mentioned, the colors used in the blend should be bright; such types as Alizarine Sky Blue B, Alkali Fast Green 3G, Cloth Red B, Chrome Blue GD, Superchrome Garnet Y, Alizarol Yellow 3G and GW, and Chrome Orange GR are a few of the types which are particularly recommended for this work as giving excellent results. Another type not so widely used as might be is Violamine, which gives a brilliant shade with 1 or 2 per cent of color dyed acid, and which, when after-chromed, stands milling, does not stain the white wool and is very level dyeing, although the latter is not necessarily an essential requirement for this work.

## SCOURING, MILLING AND FULLING

The blend of wools should be well mixed before carding and a good grade of wool oil used in the emulsion so as to eliminate the necessity of a too harsh scouring. The fabric should be constructed so as to require not over one hour of milling, and should be so laid out in the loom as to enable it to be fullled in both length and width, or to be at least trapped during the entire process of fulling.

The soap used should be of sufficient body and strength to master the grease in the material from the time the goods are soaped in the fulling until they receive the first soaping in the washer, which should not require any additional soap but simply the application of a little hot water (about 110 deg. Fahr.) to start a lather. After running in this first soap for from fifteen to twenty minutes, rinse thoroughly and give a light second soaping. Either a palm or olive oil soap



should be used, and very little ought to be required to bring about the desired results. Soaps of this character are recommended because of the fact that the goods are easily freed from all traces of soap and no odor is left in the material.

After the goods have been rinsed in hot water for from forty-five minutes to one hour they should then be rinsed in cold water and enough cold water left in the machine to cover the material, with about 1 per cent of dilute sulphuric acid added to the bath. The goods should be run in this solution for fifteen minutes and then thoroughly rinsed in cold water. The treatment in the acid bath will have a tendency to brighten the colors in the blend, but should never, under any circumstances, be used until all trace of soap has been completely washed out, and under no conditions should acid be applied to goods which are to be piece-dyed.

#### FINISHING

After washing, extract, dry, steam, shear fairly close on both sides with raising and laying-on brush

both in use. The fabric should be sheared, not "scraped," until the weave comes up clear and threads show plain and round.

Homespun, as a rule, are not pressed, but are given a good steaming, although as a matter of fact a light pressing with what is termed a cold cylinder and a hot bed is good practice. In other words, the goods are really not pressed but "rolled" through the press, which, while admittedly a form of pressing, is in reality nothing more than ironing or straightening out the fabric; no semblance of press or sheen belongs to what is known as a genuine homespun fabric. It will be noted that very little finishing is required. With the use of wools which are free from burrs and vegetable matter, goods will require very little, if any, specking.

By making use of ten different colored wools mixed with from 50 to 75 per cent white wool, a very wide range of colored effects may be produced, and by crossing the warp with different colored filling, or vice versa, and using the same range of colors, an almost endless variety of color-scheme effects can be worked out.

## Notes on the Dyeing of Direct Blacks on Cotton Piece Goods

Applications of the Direct Blacks—Dyeing Jet Blacks—Treatment of Boiled-Out Gray Material—The Dyeing Process—Economizing on Dyestuff—Suggested Plant for Production of Jet Blacks with Substantive Colors—Its Operation and Advantages—Dyeing without Salt—Special Plant Necessary—Simplicity of Operation—Results

By RAFFAELE SANSONE

THE dyeing of direct blacks, so largely practised before the introduction of sulphur colors, and some time thereafter, owing to the dyers not liking the use of the sulphide of soda crystals necessary for the former colors, is still conducted to a certain extent nowadays. More care, however, is exercised in the choice of the products purchased, because sulphur blacks are offered at lower prices than direct blacks and the convenience in the substitution can only be made to result from some special good qualities of the direct blacks themselves.

The great simplicity in the preparation of the baths, the avoidance of the danger of tendering—which sometimes takes place in the dyeing of sulphur blacks—the less frequent production of stains, or bronzing, and the easy decomposition of standing baths, especially when left unused for some time, have made many dyers stick to direct blacks, only dyeing in sulphur blacks when this could not be avoided, or when very fast colors were required.

#### VARIOUS APPLICATIONS OF DIRECT BLACKS

The applications of direct blacks are many, and often cover fields where the sulphur colors are valueless or have so far found little application. Some of these applications can be considered as follows:

- 1—The dyeing of jet blacks.
- 2—The dyeing of grays of different shade and fastness.
- 3—Dyeing as a ground for aniline black.
- 4—Dyeing in compound shades, as matching colors.
- 5—Dyeing of half-wool or half-silk goods.
- 6—Dyeing as a covering in calico printing.
- 7—Dyeing as a ground to be discharged in calico printing.

Among the above uses, the sulphur colors have so far only replaced the direct blacks for the production of fast jet blacks; in the others the direct blacks have so far maintained their secure position. For the above

(Continued on page 422.)

# The Manufacture of Typewriter Ribbons and Carbon Paper

Several Days of Grinding Necessary—Record and Copying Inks—Varieties of Dyestuffs Used for Black, Purple, Blue Green and Red—Basic Dyes for Copying Inks—Preparation of Carbon Paper Inks—Domestic Raw Materials Now the Rule

By PAUL J. HASSETT

*Assistant Factory Manager, Bridgeport Works, Remington Typewriter Company*

**C**OMPARATIVELY little is found in chemical literature on the subject of typewriter ribbons and carbon paper, and as the industry is quite an important one in the United States, using considerable quantities of dyestuffs, an outline of the manufacture may be of interest.

Typewriter ribbons are subjected to extremely hard usage on the machines, and in order to withstand this they must be very carefully constructed and finished. The best grades of ribbon fabric are usually made from long staple Sea Island or Egyptian cotton very closely woven, running from 290 to 320 threads per square inch. It is essential that the natural wax and accompanying impurities of the cotton fiber, as well as any warp size or oil accumulated in the manufacture of the fabric, be removed in finishing. The cloth must be as absorbent as possible in order to properly take the ink. The finishing process generally consists of one or more boils in Soda or Soda and Caustic, thorough washing, treatment with Malt or Diastafor to remove the warp size; but no chemic, as whiteness is not necessary.

## FINENESS OF GRINDING FOR DRY COLORS ESSENTIAL

The ribbon manufacturer receives the cloth from 36 to 40 inches wide and slits it into the required ribbon width, one-half inch being the most popular width. In the slitting operation, or following it, the edges of the slit ribbon are sealed with adhesive to prevent fraying. This is usually a glue solution made pliable with glycerine. The ribbon is then ready for inking without further treatment.

The inks are applied to the fabric by means of padding machines, in which steel or soft rubber rolls are used, the latter producing the best work, as the tendency which steel rolls have to crush the edges of the ribbon is thus eliminated. Ribbon inks are essentially a combination of dry colors ground in oil, with or without the addition of oil soluble colors. The dry colors must be in a finely divided condition in order to get the full benefit of them and to lessen the tendency of the ink to fill the type characters on the typewriter. Steel roller mills are generally found to be the best adapted for this fine grinding, and it is often necessary to grind a batch of ribbon ink for several days in order to produce the required degree of fineness.

## VARIETIES OF BLACK IN USE

Ribbon inks are divided into two classes, record and copying, the so-called rapid roller and hektograph inks falling in the latter class. The record ink most used is black, and this is usually a mixture of Lamp or Carbon Black in oil toned up with the so-called Base or Oil Soluble Blacks. Suitable base colors are the Nigrosine and Induline Bases, which are dissolved in Red Oil or oleic acid, then ground with the Carbon Black on a mill of either the roller or hopper type. Black Record is the only ribbon ink suitable for permanent records. Writing made with it, by reason of its high carbon content, is practically permanent and will withstand prolonged exposure and the usual color destroying tests. The blacks for two-color inks are usually produced from Carbon Blacks without the addition of oil soluble colors, Iron Blue or Blue Lakes being used for shading the Carbon Blacks.

## VIOLET LAKE FOR PURPLE

The next in importance among the record inks is purple, which is a very long wearing color, but not permanent. This is made from a Violet Lake (usually Methyl Violet precipitated on a base of aluminum hydrate and blanc fixe) ground in a non-drying oil, such as lard, neatsfoot, peanut or mineral, together with the base of Methyl or Crystal Violet dissolved in oleic acid. The bases of Methyl Violet 2B and Victoria Blue B, when dissolved in oleic acid, have very high tinctorial strength, and by reason of this are extensively used in ribbon and carbon inks, both directly in inks of the same shade and for toning blacks. They impart long wearing qualities to the inks, but their use is limited to those for single color ribbons as no method has yet been found for preventing the colors from bleeding into each other if they are employed in bichrome or two color inks. For the latter Lake Colors ground in oil are employed.

## BLUES, GREENS AND REDS

Blue Record Single Color Ink is made from Victoria Blue B Base dissolved in oleic acid combined with a Blue Lake ground in oil. Green is but little used and is made usually from a combination of Victoria Blue B



Base and an Oil Yellow dissolved in oleic acid. Red is largely used for two color record ribbons and is usually made from Lithol or Geranium Lakes ground in oil.

#### BASIC DYES FOR COPYING INKS

Copying inks are made by grinding water soluble colors in non-drying oils. No solution is effected, the oil simply acting as a vehicle. The basic dyestuffs are practically the only class suitable for this purpose, although Croceine Scarlet and some of the Eosines find a limited use. Crystal Violet Extra is used extensively because of its high tinctorial strength and the rapidity with which it goes into solution. These properties are essential in dyestuffs for copying ribbon inks, particularly when the typewritten matter produced with them is to be copied on a rapid roller machine. In this case the typed sheets with a moistened sheet of tissue are passed rapidly through a set of squeeze rollers, and the writing is thus only momentarily in contact with a small amount of water. If concentrated and easily soluble dyes are not used in the work poor illegible copies will be the result. Small amounts of water in soluble colors—that is, Lake Colors—are sometimes added to the copying inks in order to preserve the character of the record after it has been copied. Rapid Roller and similar processes are largely used in foreign countries, but they have been quite generally replaced in this country by carbon paper as a means of making duplicates of typewritten matter.

#### PREPARATION OF CARBON PAPER INKS

Carbon paper inks are essentially mixtures of wax,

color and oil. The colors and oils used in ribbon inks are generally suitable for carbon paper and the wax most largely used is Carnauba. It is employed either alone or with the addition of such waxes as Bees, Ceresine, Palm and Montan for special purposes. In making inks the wax is melted in a mixing kettle, the oil and color added, then the whole is thoroughly ground. It is then remelted and applied hot to the tissue in a Coating-Machine which has a means of regulating and equalizing the amount of ink applied to the tissue. From this equalizing device the coated tissue passes directly over the rolls kept cold by cold water which suddenly chills and sets the ink on the tissue.

In the olden days Logwood was the chief source of black for carbon paper manufacture, but this has been replaced by the Carbon Blacks made from natural gas. The trade calls for many different varieties of carbon paper and to meet this demand considerable skill and a thorough knowledge of the materials and colors he has to work with are required of the ink manufacturer.

#### DOMESTIC RAW MATERIALS SUPPLANT FOREIGN

It is interesting to note that while practically all the raw materials for ribbon and carbon manufacture were imported prior to the war, the larger manufacturers enjoyed considerable export trade in the finished product, by reason of its excellence and their ability to meet price competition. Since the war satisfactory sources of raw materials have in most cases been developed in America and a considerable portion of the export trading is being regained in spite of the exchange conditions.

## Things Every Textile Chemist and Colorist Should Know

*[Note—Under this heading is introduced as a more or less regular feature the discussion of certain fundamentals which should be a part of every textile chemist's and colorist's working knowledge. It is hoped that such discussions will instruct some of the younger readers, and serve as a review for those of broader experience and knowledge.]*

### No. 5

#### Manufactured Fibers

##### GENERAL CONSIDERATION

THE term manufactured fiber is applied to fibers produced wholly by a mechanical process in contradistinction to the natural fibers which are produced wholly by natural processes whether animal, vegetable or mineral. There are three types of such fibers, namely, the (1) manufactured organic fibers, including artificial

silk; (2) manufactured mineral fibers, including glass wool and slag wool; (3) manufactured metallic fibers, including tensile thread, fine metallic wire and steel wool, but of these the manufactured fibers are by far the most important.

##### MANUFACTURED ORGANIC FIBERS

*General Consideration.*—For various textile purposes there has always been a great demand for fibers possessing high luster. Of the natural fibers that are mechanically workable, silk possesses the most satisfactory luster, but its high cost has ever stimulated the desirability for a cheaper fiber that could, for many purposes at least, be a substitute for silk. Such a fiber apparently not existing among the natural fibers, investigators turned their attention towards the artificial production of a high luster fiber. Their endeavors along one line in particular have been highly successful and to-day we have several va-

rieties of lustrous fibers produced wholly through artificial means, although cellulose, the raw material used, is a natural product.

The principle involved in every case is that of forcing a semi-liquid substance through a very fine capillary orifice in such a manner that it may be solidified upon issuing from the orifice. In most cases a cellulose derivative is used as the raw material. The following four types have proved the most successful:

- (1) Cellulose Nitrate, Pyroxylin or Collodion Silk.
- (2) Cupro-ammonium cellulose silk.
- (3) Viscose or cellulose thio-carbonate silk.
- (4) Cellulose acetate silk.

The term "lustra cellulose" has been quite generally adopted as a term more nearly correct and less misleading than that of artificial silk.

In brilliancy and luster the lustra celluloses surpass in many instances even natural silk. Its uses, however, are somewhat limited, owing to its lack of durability as compared with natural silk and the fact that it becomes much weakened when wet with water and the various solutions incident to dyeing and finishing.

The first three types mentioned lose from 70 to 80 per cent of their tensile strength while wet, but the cellulose acetate silk loses only about 20 per cent of its strength while wet. On the other hand, cellulose acetate silk is very resistant to the action of certain dyestuffs and for this reason is much more difficult to dye than any of the other types.

#### CELLULOSE NITRATE, PYROXYLIN OR COLLODION SILK (CHARDONNET SILK)

This is the oldest type of luster cellulose and was introduced by Count Chardonnet about 1884. The manufacture of this type depends upon the fact that a solution of cellulose tetra nitrate in a volatile solvent solidifies when forced through a fine opening in cold water. The product is immediately dried and reeled in the form of a continuous fiber, a varying number of the individual fibers being combined. When made from pure pyroxylin the fiber is so inflammable as to be extremely dangerous. Methods have been devised, however, for treating it with various reagents such as ammonium sulphides and chlorides, the process being commonly designated as denitration. This treatment reduces its inflammability to a point where it is scarcely any greater than that of ordinary cotton. Colored effects are sometimes produced by adding the proper dyestuffs directly to the pyroxylin solution. This for various reasons is impracticable and it is most commonly dyed after it has been manufactured.

#### CUPRO AMMONIUM CELLULOSE SILK

This is also known as "Glazstoff," "Thiele Silk" and "Pauley Silk." It consists in dissolving cellulose in a

cupro ammonium solution and then forcing the gelatinous liquid formed through a fine capillary orifice into a bath of acetic acid containing sulphuric acid, where it solidifies. It may also be solidified by passing through a concentrated solution of caustic soda.

#### VISCOSE OR CELLULOSE THIO-CARBONATE SILK

This is prepared by forcing solutions of viscose through fine capillary openings into solutions of ammonium sulphate or dilute sulphuric acid where it becomes coagulated. Cellulose thio-carbonate or viscose, also known as cellulose xanthate, is prepared by first treating cellulose with a strong solution of caustic soda, and then digesting the product formed with carbon bisulphide under pressure which results in the formation of a yellowish brown pasty substance which dissolves in dilute caustic soda to a thick syrupy liquid. A high grade wood pulp is frequently used as the raw material.

#### CELLULOSE ACETATE OR ACETYL CELLULOSE SILK

Cellulose Acetate is prepared by a similar method to other lustra celluloses, a solution of cellulose acetate being coagulated by passing through water. Cellulose acetate silk seems to be quite different from the other types in many of its properties, particularly its action with dyestuffs, and also the effect which various liquids have upon it.

A solution of acetyl cellulose in tetra-chlor-ethane is used in the manufacture of the so-called "dope" for aeroplane fabrics.

#### GELATIN AND CASEIN SILK

Many attempts have been made to produce artificial silk of animal origin by the use of gelatin, casein and similar products. These have been made in a semi-liquid form and forced through fine openings in an atmosphere of formaldehyde which coagulates the substance into a firm fiber. All attempts along this line, however, have proved failures from the point of view of practical manufacture, and are not commercial articles.

#### CORN MEAL SOAP

Ineffectual attempts have been made with oatmeal soap, corn meal soap and the like, but it has been left for a comparatively young concern, and one not previously engaged in the industry, to introduce to the markets of the world this new soap that is not—speaking strictly from a technical standpoint—a soap at all, although it is like it in every respect. The process of manufacture actually does convert the entire grain into an entirely new substance, still preserving the detergent or cleaning properties which the leading soap chemists of the country have sought for so long to include in the manufacture of soaps.

If the evidence of our own eyes is not enough, there is



available the written testimony of some of the best known industrial chemists in the world to-day, one of whom, the firm of Arthur D. Little, Inc., has stated: "We spotted some white cloth (cotton) with ink and blueberry juice and allowed them to dry over night, and then washed them with the powder (cereal soap). The stains were completely removed.

Laboratory experimentation upon the finished product, looking to find traces of the original corn meal, proves even with an iodine test that not a starch cell remains. To the lay mind this may not seem particularly important, but to those who are interested in the "why" of the various new products which reach the market from time to time, it is the answer to how it has been possible to improve the usual cleaning properties of soap to a point far

beyond that ever reached before without the aid of acids and chemicals of a harmful nature.

As is usual with almost every real discovery big in its benefit to mankind, it is extremely simple in its elements. This new process of making soap is not only revolutionary in its final result, but also completely upsets the traditions of the fraternity of soap makers.

And yet, go to the expert chemists and ask why this soap accomplishes the seemingly miraculous, and you will be told that they do not know. Neither do the manufacturers. Many people are hard at work trying to find out and expect to know some day, but the truth remains at present that only a very few people in the world even know how to make it, and there is not one who claims to know why the finished product embodies the properties which it does.—"Journal of Commerce."

## Mordanting Wool for Hematine

Fully Basic Mordant Gives Stronger Dyeing than Unreduced Mordant—Effects of Chromic Acid on Hematine—Sodium Bisulphite the Cheapest Reducer of Chrome—Strength of Dyeing Improved by Soda Treatment—Lactic Acid as an Assistant—Use of Alkali Other than Soda Ash Permissible

By A. B. CRAVEN

[Read before the Midlands Section of the Society of Dyers & Colourists, and printed in the *Journal of the Society*]

THE object of this work was to investigate the use of sulphites and bisulphites as chrome reducers in mordanting wool for Hematine, there being need for a cheap chrome reducer to substitute the very expensive tartar. America is no longer self-supporting as regards tartar and tartaric acid, and has now to share the European production, which will keep up the price.

It is well known that Logwood or Hematine dyed on reduced chrome is faster to light than when dyed upon yellow chrome mordant. Other advantages of the reduced mordant are that the dye bath is cleaner and the shade is faster to rubbing, as the yellow chrome mordant is never completely fixed, and some chrome always bleeds off into the dye bath.

### REDUCTION OF MORDANT

Any yellow chrome remaining on the wool becomes reduced during the dyeing at the expense of the Hematine, and inferior fastness to light is the result. There is present in commercial Hematine other oxidizable matter which prevents the action of the yellow chrome from being really disastrous, but every dyeing on this mordant falls short of the high standard of fastness to light given by the reduced mordant.

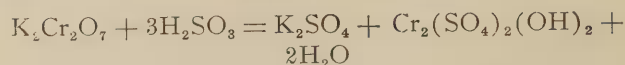
Hematine is usually dyed on a yellow chrome mordant, as it is usually fast enough to light when so dyed, and the additional fastness obtained on reduced chrome is not considered worth the expense in time and material involved in reducing the chrome; but the reduced chrome

mordant has the additional advantage of yielding deeper as well as faster colors.

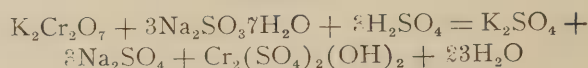
### REACTIONS OF CHROME REDUCTIONS BY SULPHITES AND BISULPHITES

The reactions which take place when chrome is reduced by sulphites and bisulphites are—

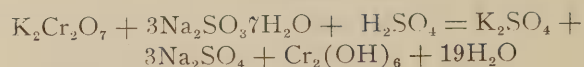
#### Equation (0)



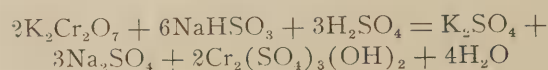
#### Equation (1)



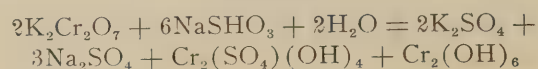
#### Equation (2)



#### Equation (3)



#### Equation (4)



Sulphurous acid is, of course, the effective agent in all the equations.

Equation (0) shows the reaction when the exact amount of sulphurous acid required reduces bichromate.

(1) is very similar to (0). The sulphite and sulphuric acid liberate 3 mols. of sulphurous acid yielding exactly the same end product as in (0).

(2) is different, in that less sulphuric acid has been used. If this reaction proceeds to completion the end product would be  $\text{Cr}_2(\text{OH})_6$ .

(3) uses bisulphite of soda, and is the sum of (0) and (1), and has the same end product.

(4) uses bisulphite without addition of sulphuric acid, and if this proceeds to completion the end product will be five-sixths basic.

The amount of sulphuric acid used would not in any case leave an excess of acid after reduction.

#### RESULTS OF FOUR TEST MORDANTINGS

Based on these equations, four mordantings were done, using 3 per cent chrome for one hour in the water bath at the boil. The temperature attained in the mordanting bath was 96 deg. Cent., which is the same temperature as is obtained on the large scale when boiling with open steam.

The four mordantings were then treated for one-half hour in accordance with equations (1) to (4) respectively, the additions being made to the mordanting bath without removing the patterns.

No. (1) pattern was fully reduced.

No. (2) pattern was cream color, slightly under reduced.

No. (3) pattern was pale green, like (1).

No. (4) pattern was cream color, slightly under reduced.

The result shows that equations (2) and (4) do not proceed to completion, some of the sulphurous acid remaining ineffective.

There were two patterns in each bath, and after rinsing, one of each was dyed with 4 per cent Hematine Crystals (fully oxidized). Taking the strength of the best of the four dyeings as 100, and using that as a datum line throughout the work, the comparative values of the set were 1 = 88, 2 = 100, 3 = 88, 4 = 94.

#### CAREFUL CONTROL NEEDED

The result shows that this method of reduction needs careful control to yield uniformly good dyeings. Sulphurous acid is a powerful reducer, and much quicker in action than tartar or other organic reducer, and it appeared at this stage that the cause of the weaker dyeings might be that an excess of sulphurous acid had been used: as patterns (2) and (4), which were scarcely fully reduced, and consequently would not have excess of sulphurous acid, were the strongest dyeings.

Patterns (1) and (3), which were fully reduced, would have a slight excess of sulphurous acid, for although the

amount used was exactly enough to reduce the chrome, the wool itself would reduce some of the chrome, and there would be sulphurous acid equivalent to this chrome in excess. The patterns were well rinsed before dyeing, but wool very tenaciously retains sulphurous acid, which would therefore be carried into the dye bath, where it would deoxidize the Hematine and thus cause weaker dyeing.

#### RESULTS FROM SECOND SET OF PATTERNS

A second set of patterns was chromed exactly as before with 3 per cent chrome, and reduced in a separate bath with the same amount respectively of sulphite or bisulphite and acid. Here all the patterns were fully reduced.

In this case the sulphurous acid will be in excess in all cases because the chrome left in the mordanting bath is out of the way, and there will be therefore less sulphurous acid consumed, and more available to show any harmful effect upon the dyeings for which sulphurous acid may be responsible.

The patterns were rinsed and dyed as before, and the strength came out as follows: 1 = 40, 2 = 80, 3 = 30, 4 = 56. The strength is in the same order, but all are strikingly weaker than the first set. Duplicate patterns were mordanted and reduced at the same time.

#### SULPHUROUS ACID AS A CAUSE OF WEAKNESS

In order to confirm the suspicion that sulphurous acid retained by the wool was at the bottom of the trouble, the No. (3) of the second set was repeated, but before dyeing the mordanted and reduced wool was worked in a bath containing peroxide of hydrogen to oxidize the sulphurous acid and prevent the action on the Hematine. Care was taken to avoid excess of peroxide. The pattern was then washed and dyed, the result being a strength of 100, conclusively proving that sulphurous acid in the wool was the cause of the weakness and variation of strength noted.

It was now clear that the minimum of sulphurous acid must be used.

In another experiment the excess of sulphurous acid was neutralized in a bath containing  $2\frac{1}{2}$  per cent soda ash on the weight of wool for a quarter of an hour in the water bath. This treatment gave a remarkable improvement in the dyed strength in every case, the first set reaching a strength of 120, all four being practically equal. The second set gave strengths varying from 100 to 110.

This soda treatment improves even those patterns of the first set (numbers 2 and 4), which, being barely reduced, are unlikely to hold excess of sulphurous acid.

Comparing this with 3 per cent chrome alone and with 3 per cent chrome reduced with tartar we get: Reduced by sulphurous acid and soda treated, 120; chrome alone, 102; chrome and tartar, 102. The strength of 120 is exceeded when the minimum of bisulphite is used in a separate bath.



## SECONDARY EFFECT OF SODA TREATMENT

There was evidently another action of the soda ash besides removal of sulphurous acid, and to confirm this another pattern of No. 3 of the second set was treated with peroxide of hydrogen to remove the free sulphurous acid, and then further treated with soda ash and dyed. This proved that the secondary effect of the soda treatment gave an improvement of 20 per cent in strength.

The equations show that with the exception of No. 2 the end product is not fully basic chromium hydrate, and it seems clear that the production of a non-fully-basic mordant is inherent to reduction by this method. It therefore appears that the strongest dyeings with Hematine are only obtained upon a fully basic reduced chrome mordant, and the second action of the soda is to bring this condition about.

Bisulphite was recommended by Koechlin for reducing chrome as long ago as 1853, and later by Knecht. The method has never become general, and the reason probably lies in the behavior above described.

In a patent in 1915 for the use of sulphite of soda and sulphuric acid, H. E. Wood evidently prefers sulphite to bisulphite for reducing chrome for Logwood Black and Alizarin colors. His method is to mordant with  $1\frac{1}{2}$  per cent chrome and 2 to 4 per cent sulphuric acid for three-quarters of an hour, and then add about 2 per cent sodium sulphite, and continue half an hour longer.

## SODIUM SULPHITE VS. BISULPHITE

The superiority of sodium sulphite over an exact equivalent of bisulphite has been corroborated. The difference in strength is evidently produced through the greater acidity when bisulphite is used, which gives a less basic reduced chrome. Soda treatment before dyeing improves both, and makes both practically alike.

Another reason why sulphite is preferred by Wood for the alizarin colors may be that bisulphite often contains a trace of iron, while sulphite is usually free from iron.

Long washing after mordanting would remove some sulphurous acid if excess was present, and produce a more basic mordant, but this action is always incomplete, so that long washing is far less effective than alkali treatment of very short duration. No. 3 of the second set improved from 30 to 40 by washing forty minutes as against from 30 to 100 by soda treatment.

The more usual chrome mordants are not so liable to produce variable results as the sulphurous acid reduced mordant with chrome alone.

## DESTRUCTION OF COLOR SHOWS REDUCTION OF HEMATINE

The chrome is partly reduced by the wool itself, and this reduced portion is fully basic, but the unreduced chrome existing on the wool cannot act as mordant until it is reduced, so that it becomes reduced during the dyeing, and chiefly at the expense of the Hematine, but when reduced the mordant will be fully basic.

If no destruction of color took place this dyeing would be equal to the maximum strength, so that the extent it falls short will be the measure of the destruction of Hematine, and the shade on 3 per cent chrome alone was weaker than the maximum by 20 per cent.

The amount of destruction will vary with the difference in reducing power of the wool and its cleanliness, and may be less than 20 per cent in some cases. The amount of chrome fixed upon the wool was only one-quarter of the 3 per cent used, after one hour's mordanting. There is no advantage of soda treatment in this case.

With 3 per cent chrome and 1 per cent sulphuric acid, the amount of chrome fixed is greater than in a sweet chrome bath. Some reduction takes place by the action on the wool, and the remainder of the chrome is unreduced. The portion of the chrome reduced is certainly not fully basic, but will become so when reduced in the Hematine dye bath. With this mordant the destruction of Hematine is greater than with chrome alone.

A trial was made with 3 per cent chrome and 1 per cent sulphuric acid, in which the mordanting was continued until the whole of the chrome was reduced by the wool. This green mordant gave an improvement of 20 per cent by treatment with soda, showing clearly a lack of basicity.

## ALKALI TREATMENT OF MORDANT

The chrome-tartar mordant again shows improvement of about  $12\frac{1}{4}$  per cent by soda treatment. There is no destruction of dye in this case, but the mordant is not fully basic. Tartaric acid and other chrome assistants behave in a similar manner to sulphuric acid or to tartar, so that there seems no assistant available which will reduce the chrome and at the same time give a basic mordant can be improved by alkali treatment before dyeing with Hematine.

The reduction of the chrome and the alkali treatment can be combined on one operation by using an alkaline reducing agent, e. g., hydrosulphite and soda ash or glucose and soda ash. Both methods are more expensive than bisulphite first and soda ash afterwards.

## LACTIC ACID REDUCES CHROME COMPLETELY

Lactic acid needs special mention. It reduces the chrome completely, and entirely exhausts the mordanting bath in one hour when used in the proportion of 3 of chrome to 4 of true lactic acid. With this mordant there is no liability to variation, and the strength obtained without soda treatment is quite good, and as the bath is exhausted the soda treatment can follow in the mordanting bath, and by neutralizing any alkalinity left with a little acetic acid the same bath may be used for dyeing. Thus the reduced and fully basic mordant, and consequently maximum strength, may be obtained in one bath.

A probable explanation of the non-basic mordants yielding weaker dyeings is that a body of the type  $\text{Cr}_2(\text{SO}_4)_3$  (Hem)<sub>2</sub> is formed, whereas for full strength

$\text{Cr}_2(\text{Hem})_3$  should be produced. After dyeing on such a mordant as will produce a weak shade, the color is not left in the dye bath as would have appeared possible.

The ferric iron mordant also gives a weaker shade when it is not basic, and a still more important disadvantage is that the non-basic iron mordant is not fast to light. If the mordant is fully basic, the dyeing is stronger and is fast to light.

#### RECOMMENDED MORDANTS FOR HEMATINE

The following mordants have been found satisfactory on the small scale, and are recommended to the dyer for use with Hematine—[Bisulphite 78 deg. Tw. containing 25 per cent total  $\text{SO}_2$ .]

*For 3 per cent Chrome alone.*—Reduce in separate bath with 1 to  $1\frac{1}{2}$  per cent bisulphite and 0.2 to 0.3 per cent sulphuric acid.

Without soda treatment the reduced mordant dyes 5 to 10 per cent stronger than the unreduced mordant. Soda treatment with  $2\frac{1}{2}$  per cent soda ash on the weight of the wool gives a strength about 20 per cent stronger than the unreduced mordant.

*For 2 per cent Chrome and 0.5 Sulphuric Acid.*—Reduce in separate bath with  $1\frac{1}{2}$  per cent bisulphite and 0.3 per cent sulphuric acid.

This, when soda treated, gives a strength about 25 per cent stronger than the unreduced mordant.

*For 3 per cent Chrome and 1 per cent Sulphuric Acid.*—Reduce in separate bath with  $2\frac{1}{2}$  per cent bisulphite and 0.5 per cent sulphuric acid.

This, when soda treated, gives a strength about 25 to 30 per cent stronger than the unreduced mordant.

In all cases the shade on reduced mordant is brighter than on the unreduced mordant.

*For Chrome and Lactic Acid.*—Two per cent chrome,  $\frac{1}{3}$  per cent lactic acid (50 per cent by weight). Three per cent chrome, 8 per cent lactic acid (50 per cent).

Both baths will be completely exhausted in one hour. Soda treatment and dyeing may follow in the same bath.

It might be suggested that instead of using a fully oxidized Hematine, a less oxidized product be used, so that when dyeing upon a yellow chrome mordant the color would be fully oxidized and the chrome reduced, and thus obtain all the benefits of a reduced mordant very simply. In practice this is not satisfactory, for although there is less destruction of Hematine there is certainly some destruction on account of the conditions under which the color is oxidized.

*Summary.*—The following facts have been established—Hematine is sensitive to oxidation by chrome in the form of chromic acid, and also sensitive to reduction by sulphurous acid.

Chromic acid destroys some Hematine during the dyeing, and also detracts from the fastness to light of the dyed black. The reduced chrome mordant does not destroy any Hematine during the dyeing, and when fully basic gives a much stronger dyeing than an unreduced mordant. However reduced, and whether soda treated

or not, the reduced mordant gives a much superior fastness to light.

Bisulphite of soda is the cheapest reducer of chrome, and when no excess is used, the dyeing with Hematine is stronger than upon any unreduced mordant.

With soda treatment, the strength is still further improved. Lactic acid is an assistant which reduces the chrome and exhausts the bath at the same time when used in the proportions given. Chrome and lactic mordant without soda treatment gives stronger dyeings with Hematine than any yellow mordant, and with soda treatment a further maximum improvement is obtained.

A new additional advantage of reduced chrome has been disclosed in this paper—the improvement in strength brought about by soda treatment.

Alkali other than soda ash may be used, ammonia or borax being just as effective.

In conclusion, the writer desires to acknowledge his indebtedness to the directors of the Yorkshire Dyeware & Chemical Company, Ltd., in whose laboratory at Selby the work was carried out, for permission to read this paper before the Society.

#### WRINKLES IN FABRICS

Every finisher of every kind of fabric runs into wrinkles at times which he would gladly dispense with. There are fulling mill wrinkles, washer wrinkles, dye-kettle wrinkles, crabbing machine wrinkles, steamer, napper, teased gig, brush, sander, shear and press wrinkles. All of these may be termed mechanical wringles.

Then there are physical wrinkles, such as lay wrinkles, crow's feet wrinkles, frozen rigs, wrinkles from cockles, truck wrinkles, and pile wrinkles on face goods.

Wrinkles and their various causes, phases, methods of prevention, and their several cures, if thoroughly gone into, means a long, long story.

Tightly woven worsteds, also cotton worsteds, develop wrinkles easier than any other fabric. On dark colors especially, they invite all the inborn ingenuity there may be in a finisher to keep his goods clear of them. The ordinary washer wrinkle on worsteds runs slightly on the diagonal lengthwise of the piece, generally running in from the listing towards the center and once in a while the reverse is true. The writer has found that overcrowding or filling a washer to capacity is one of the most frequent causes of this. When eight pieces of heavyweight worsteds are run in an eight-string washer, and appear at the perch showing wrinkles, six pieces of the same goods put in the same washer and scoured in the same way will come out invariably entirely free from wrinkles. On light shades, as a rule, eight pieces can safely be washed in an eight-string washer, as light shades seldom show wrinkles.

When washer wrinkles do appear the cure is really homeopathic, for that which put the wrinkles in is the best thing to take them out, and that is pressure.

Every finisher has his pet cure for wrinkles, and there are seldom two of a similar opinion. One believes in



small pot eyes in the ring board, another in large pot eyes, and yet another would forthwith dispense with pot eyes of any description. The next says the only thing is an oblong eye set on the bias. Each and every one of these contentions denotes a method to be employed to cause the goods automatically to change their position every time they pass under the squeeze roll of the washer.

It matters but little how the goods are made to change the fold if there is light pressure on the top roll, or if the soap is too thin and watery or too strong in alkali. When the soap has done its duty it is necessary to follow up with an automatic opening out of the goods in the bottom of the washer in a plentiful supply of water. They should be allowed to squirm and wriggle around like so many snakes tangled up together.

The best way to accomplish this is to have two automatic outlets, about 30 in. from the bottom of the washer. Two 3 in. holes should be bored in the sides of the washer that distance from the bottom and about the center of the machine. The bottom gates may now be kept closed and the water allowed to rise until it finds egress through these holes. There is no better method for forcing goods to change their position, and no safer or saner thing to do, for a washer thus equipped will now take care of itself without watchful waiting. By causing the goods to run in so much water they also rinse out better and free themselves from the soap quicker. Washer wrinkles are sometimes called water marks, which is a wrong designation, for water marks are a different difficulty and have nothing to do with a washer. They are also called breaks and cracks, but washer wrinkles is the correct name for them.

Worsted serge is often one of the hardest pieces of goods a finisher has to deal with in the matter of wrinkles, and when they do appear there is usually an argument between the dyer and finisher as to who is responsible. At times the dyer is the guilty one, and quite often it occurs in the finishing department; and it also occasionally happens that neither of them is at fault.

Weaving the cloth in a more open reed, or the taking out of a couple of picks per inch, may remove the trouble and still result in the production of just as close a fabric finished. A too tightly woven fabric will, of course, crack very easily both in the washer and dye-kettle, whereas, if the same cloth is made looser, it will bend instead of breaking or cracking when in the rope shape. It will, during various processes of dyeing and finishing, close up to the same density and be as firm and much softer in handle when ready for the market. By laying them properly in the loom the chances of wrinkled goods are practically eliminated, doing away with the necessity of re-finishing, with all its doubtful effects.—"Posselt's Textile Journal."

The rumor that gained considerable headway to the effect that the Arlington Mills were to be merged with the American Woolen Company has been emphatically denied by Franklin W. Hobbs, president of the Arlington Mills.

## U. S. MINES BUREAU ISSUES REPORT ON PROPERTIES OF TOLUOL

Pure toluol (also known as toluene) is a colorless oily liquid with an odor somewhat like that of benzol, states the United States Bureau of Mines in Technical Paper 268, just issued. Its freezing temperature is low, nearly 100 deg. Cent. Its boiling point is 111 deg. Cent. and its specific gravity is 0.872 at 60 deg. Fahr. Its chemical properties are in many respects like those of benzol.

Commercial toluol, a product of which 90 per cent will distill below 120 deg. Cent., is usually obtained from crude benzol. The crude benzol distilled between approximately 100 deg. and 120 deg. Cent. is termed commercial toluol and has a specific gravity of 0.862 to 0.870 at 60 deg. Fahr. The uses of this product are similar to those of the benzols. Having a higher boiling point it is less volatile and dries more slowly when used in varnishes and similar preparations—an advantage in many of these preparations. It is a valuable ingredient in turpentine substitutes.

Commercially pure toluol may be prepared from the 90 per cent toluol by further distillation and rectification. As the boiling point of pure toluene is 111 deg. Cent., the fraction separated begins to boil at 111 deg. Cent. and to yield 95 per cent at about 111.8 deg. Cent. or 100 per cent within 2 deg. of the boiling point of toluene, that is, 111 deg. Cent.

Chemical plants work this product into a more refined product. Commercial toluol is the source of the explosive T. N. T. (trinitro-toluene), of dyes for cotton, of synthetic flavoring, and perfume materials, and of other chemical compounds.

In the physico-chemical study of sulphur in coke, being made by A. R. Powell, physical organic chemist of the Bureau of Mines at Pittsburgh, Pa., experiments have been conducted on the study of the decomposition of calcium sulphide. It was found that, working with boiling water at 100 deg., calcium sulphide is hydrolized very slowly, the rate being increased by the addition of magnesium oxide. Small-scale laboratory tests will be made on coke.

Andrew C. Imbrie, treasurer of the U. S. Finishing Company, said recently, "The progress of the American dye industry has reached a point where it is able to supply about 84 per cent of all the colors used by the average American consumer. For example, my own company, the United States Finishing Company—operating five plants engaged in the business of bleaching, mercerizing, dyeing, printing and finishing cotton piece goods, and with an annual capacity of 300,000,000 yards—is able to do with American colors, quite as good work as was ever done before the war with German colors of the same types. Applications for licenses to import German and Swiss colors have been necessary in less than 10 per cent of the colors used."

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

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## A NEW LESSON FROM ITALY

A RECENT dispatch to a Yorkshire newspaper states that Dr. Karl von Weinberg, one of the principals of the I. G., has purchased 51 per cent of the shares of the Bianchi dye manufacturing firm in Italy. According to the reported agreement, the Germans will give the Italian firm such technical and other assistance as may be necessary for the development of the business on a scale justified by current and future Italian economic conditions, and the German interests are to receive 51 per cent of the profits.

That there will be profits seems reasonably assured, despite the hard sledding which the Italian dye industry has experienced during the past few years. The I. G., for one thing, is not disposed to buy into anything which has no future, or which cannot be made to have a future, and certain it is that representatives of this giant organization are supremely well qualified not only to estimate the possibilities of a dye manufacturing concern but likewise to render aid of a character to bring about their realization.

That the Germans found a way to buy into the Italian dye industry is not at all surprising. They have for long enjoyed a strong foothold in that country, and, indeed, fully expected Italy to join with the Central forces in the war. Italy has been a ready market for the sale of German goods, transactions being financed in many cases by German-controlled Italian banks. Since the Armistice, with its Reparation provisions, German colors admitted under the terms therein laid down have offered the strongest sort of competition to the domestic products; for, while protective legislation similar to the variety in force here has been set up as a safeguard to Italian enterprise, all dyestuffs other than Reparation colors being imported in bond and subject to the control of the Italian Minister of Finance, nevertheless the demand has been

so limited recently that Italy's share of the Reparation colors alone, which are accepted as shipped every few months, has been sufficient to flood the market. And on anything in the way of a dyestuff otherwise imported, Germany has distinctly had the call when it came to a question of price and service.

Hence, it would seem as though the step reported above was almost inevitable from the outset—or in any case became so when the slump hit the Italian dye consumers. Lacking adequate plant facilities, chemists, technical experience and the ability to sell with their products such service as the Germans could give, the Italian dye makers fought a losing battle. Whether or not the situation can yet be saved, or whether or not even the disposition to save it will survive, can only be surmised. The purchase of the controlling interest in the Bianchi company may be the beginning and the end, or it may be a new entering wedge for a resumption of "the old order," with Germany again exercising complete control of the dye situation in Italy. Whatever may transpire, however, the present successful move should be a lesson for the Senate, engaged at this writing in making up its mind on the question of American protection, to study and reflect upon.

With the help of the artificially maintained war embargo, the American dye manufacturers have held even with the game, in spite of competition from America's Reparation color allotment. But they are still very much in a false position, a position which is calculated to deceive anyone who has not examined the situation into concluding that they are well-nigh impregnably fortified. And if their position is not rendered solid in actuality as well as in appearance, the time yet may come when the industry will be startled by even more pertinent rumors than those, now being bandied about, to the effect that the British Dyestuffs Corporation has sold out to Germany. And what is more, the new rumors may turn out to be far better founded than the British. Above all things, that should never be allowed to happen here, nor need it happen if the Senate will but look to the stabilizing of the industry by adopting a settled policy for a term of years, instead of weakening it by failure to make up its mind.

## A WELCOME HELP TO CHEMICAL INDUSTRY

THE American chemical industry is gradually eliminating the obstructions that nearly always appear in the path of a new and rapidly growing industry. These stumbling blocks are the natural results of individual effort which is not standardized. For instance, every producer of chemical equipment gives a special name of his own making to the products turned out by his factory. The result is that prospective purchasers are frequently confused by the



different names of similar products put out by several manufacturers.

Such annoyances, it is believed, will soon be done away with, since the newly organized Chemical Equipment Association has begun to function. At a recent meeting at the Chemists Club, New York, the Association formally adopted by-laws and outlined a plan of action. The objects of the Association are to:

Encourage high standards in the industry.

Promote a better knowledge of conditions controlling the industry's development.

Take steps to bring about definite understanding as to professional services rendered to purchasers in connection with sale of equipment.

Investigate conditions surrounding the resale of equipment originally produced for specific purposes.

Disseminate information as to methods of arriving at correct costs.

Standardize trade phrases.

Collect and disseminate information as to design, raw material and construction.

Take suitable and timely notice of, and action upon, matters of legislation, both national and State, which affect the members of the Association.

Collect and disseminate market statistics, both domestic and foreign.

Collect and disseminate information as to labor conditions and relations—

And enter into such other legitimate trade association activities as may be deemed in the interest and welfare of the industry.

The Association made a particular point in its by-laws of the fact that it will not undertake any activity which will restrain trade, limit production or competition, or regulate prices.

This Association is the fourth organization in the chemical industry. The Synthetic Organic Chemical Manufacturers, the Manufacturing Chemists and the Scientific Instrument Makers already have organizations. The Chemical Equipment Association is an organization of manufacturers of chemical process equipment.

One of the chief difficulties that have been encountered in the past concerns the matter of technical service in installing equipment in plants. For example, when a purchaser orders equipment from a manufacturer it is usually necessary for a technical man to go to the plant to properly install the new equipment, and also to give instruction in the care and operation of such equipment. There has been in the past confusion as to the proper method of charging for such service. The new organization will standardize equitable charges in such cases.

An equal degree of difficulty has frequently arisen over the resale of chemical process equipment manufactured for specific purposes. The handling of second-hand machinery of this character has in many cases fallen to men who know nothing about the man-

ufacturing of chemical equipment. Now, through the Association, the heavy equipment manufacturers will endeavor to protect themselves and their customers by determining some new and better method of handling such second-hand materials.

This move of the equipment manufacturers to organize and eliminate duplications in trade nomenclature and the thousand and one other exasperating and time-wasting conditions arising from go-as-you-please, individualistic manufacturing and marketing, is in line with the general trend of the past year or so in our chemical industries, and is to be heartily welcomed as one more step in the direction of eventual unity and independence.

### AN ALLIED ISSUE

THE objects of the Fordney tariff bill, according to the official title of this measure now occupying the intermittent attention of our Senators, are specifically "to provide revenue, to regulate commerce with foreign countries, to encourage the industries of the United States, and for other purposes."

During one of the series of debates which the proposed measure has occasioned recently, the following colloquy took place between Senators Walsh and Smoot:

Mr. Walsh: Mr. President, may I ask the Senator if camphor is not a very important product in the manufacture of celluloid?

Mr. Smoot: It is.

Mr. Walsh: And is it not a fact that Japan practically controls the entire output of camphor?

Mr. Smoot: She controls the entire output, with the exception of what little synthetic camphor was made in Germany before the war and what we made during the war; and to-day the one factory in the United States that made synthetic camphor during the war is closed entirely.

Mr. Walsh: Is it not a fact also that Japan took advantage of war conditions to demand a very, very excessive price for camphor?

Mr. Smoot: Not only did they double the price but in many cases they sold the camphor at an advance of six or seven hundred per cent.

Mr. Walsh: I think our celluloid manufacturers desire to have camphor put on the free list; and I notice that you have retained a duty, notwithstanding the fact that you say the only synthetic camphor factory in this country has gone out of business.

Mr. Smoot: That is true; but it will stay out of business even with the rate that we have provided.

Mr. Walsh: Why put a duty on camphor, then, if we are not producing it here?

Mr. Smoot: What the St. Louis people wanted was a 25 per cent ad valorem duty. If we had given them a 25 per cent ad valorem duty, that would have had to be carried clear through all the celluloid goods made

in this country, with a higher rate of duty; and the committee thought they could not go that far.

Mr. Walsh: One of the troubles with this bill and this schedule is the effort to maintain one little industry at the public expense.

Mr. Smoot: Of course we have not done that, however. The duty of 6 cents per pound provided on camphor is not going to do that. In fact, I think the Monsanto people will have to turn their camphor plant into some other line of industry.

It will be noted that Senator Smoot admitted on the floor of the Senate that the Japanese practically control the entire output of camphor, and that during the war "not only did they double the price but in many cases they sold the camphor at an advance of six or seven hundred per cent."

In the face of that statement of facts, he said: "I think the Monsanto people will have to turn their camphor plant into some other line of industry."

Senator Smoot is one of the Republican leaders in the Senate, but the position he has taken, with reference to the manufacture of camphor in the United States, is not in harmony with Republican principles of encouraging American industries, nor in accordance with the purposes for which the proposed new tariff bill is to be enacted into law.

The Monsanto Chemical Works already has an investment of over \$600,000 in its undertaking to manufacture camphor in the United States. That investment will practically be wiped out—if Senator Smoot's views on the proposition are sustained by the Senate—and instead of encouraging an industry in the United States that will utilize hundreds of thousands of gallons of turpentine—an American natural product—and employ a large number of American workmen, he proposes the continuance of a Japanese Government monopoly, for the benefit of the Japanese and the Eastern seaboard importers of camphor.

N. M. Clark, vice-president of the Celluloid Company of America, testifying before the Ways and Means Committee said: "The competition from Japan threatens to annihilate us. Europe and America are in a similar position as regards camphor, which enters largely in our commodity, but Japan rules the world as to this item. We are at her mercy when we buy camphor. She tells us how little or how much we may have, the prices we must pay, and has systematically reduced our supply."

There is about five million pounds of camphor consumed annually in the United States.

This excuse for failure to provide properly for an industry in a peculiar position, or having a unique claim to consideration strictly on its own merits and irrespective of decisions in other cases, on the ground that legislative exceptions made in its favor must be duplicated throughout the interminable list, has a very familiar ring. It has repeatedly been used by foes of adequate protection

for our coal-tar chemical industries whenever they have been driven against the wall, and they have particularly made use of it in reference to the dye portion of these industries. A contemporary even went so far on one occasion—which readers of *The Reporter* may recall—as to try to saddle the coal-tar chemical industries with the responsibility for placing an embargo upon *all* goods brought from other shores, advancing the absurd argument that since dye makers advocated an embargo in their particular case, they must uphold this principle universally, or forthwith abandon it!

In many ways the above issue is closely allied with the struggle of the dye people to obtain proper protective legislation, and if the Senate committee believes it can dismiss this issue in the fashion made apparent above it will find itself mistaken. Attempts to reduce all tariff problems to a common denominator, or to solve them all in some kind of a patent automatic tariff machine, were always futile and are, moreover, going out of style. This much can be said to the credit of our Solons, many of whom have seen the light. It now remains to convince the others and to complete the succeeding step leading to individual treatment for each problem as it arises. In this way only can a so-called "scientific tariff," which is spoken of so feelingly on the Senate floor at intervals, be created.

Meanwhile, the Senate proper will do well to review very minutely the findings of its committee with respect to the proposed duty on camphor.

## Recent Patents

### Bleaching Powder and Process of Producing the Same (1,409,955; March 21, 1922)

EDWARD THORNDIKE LADD and EBEN CHILDS SPEIDEN,  
Niagara Falls, N. Y. (assignors to Isco Chemical  
Company, Niagara Falls, N. Y.)

This relates to the bleaching powder known in commerce as "chloride of lime," and has for its object to provide a process for producing the same which will be simple and inexpensive to carry out, and a product which will be more efficient in use than those heretofore proposed.

It is well known that in preparing the ordinary bleaching powder it is customary to hydrate quicklime containing calcium oxide (CaO), thus producing what is commercially known as a "lime hydrate," which may contain magnesium hydrate and other impurities carried by the lime. This lime hydrate is next screened to separate therefrom the pieces of so-called "limestone" or so-called "core" of the lime lumps, as well as to separate out such other foreign or undesirable impurities as may be susceptible of being separated



out by screening. The so-called "lime hydrate" thus separated will be found to contain relatively coarse and fine particles, and the mass is next treated with chlorine in bleach chambers in the manner well known, so the "chloride of lime" or bleaching powder of commerce results.

The present inventors have observed that the lime hydrate, together with such impurities as have not been separated out by the above-mentioned process of screening, may be divided into a portion containing the relatively coarse and into a portion containing the relatively fine particles. They have also observed that if one separates out from the lime hydrate material a portion containing substantially all or a large percentage of the fine particles of hydrate and impurities present, leaving behind in a second portion a large percentage of or substantially all the coarse particles, and then treats said second portion of hydrate material with chlorine gas in the manner well known, a very different and useful product will result from that heretofore obtained. That is to say, the product of said treatment will be found to be a heavier and more massive bleach than would be the case if said finer particles had not been removed.

It is probable the larger percentage of coarser particles now remaining in said second portion of the lime hydrate mass before chlorination, changes the character or size of the pores, or interstices, existing between the particles of the hydrated lime and therefore permits a more thorough penetration of the mass by the chlorine than is possible in the prior processes, with the result that a better or more efficient chlorination results and thus produces a corresponding change on the properties of the finished product.

In the same way, the present patentees have further discovered that after removing all or a substantial percentage of the coarse particles to form said other portion of hydrate containing all or a substantial percentage of the finer particles present one treats this other portion with chlorine gas, a bleach powder will be obtained which is lighter and more fluffy than is the case when the coarser particles are left in the chlorinated mass. This change in the physical character of the last-mentioned product is also probably due to the change in porosity of the mass brought about by the fineness of the particles left therein, which must to a large extent govern the penetration of the said mass by the chlorine gas.

Each product thus produced is very different from the other, and also very different from a chloride of lime made by the ordinary processes without this new step which has been introduced. Further, each of these new products has its own special advantages for those uses to which it is especially adapted.

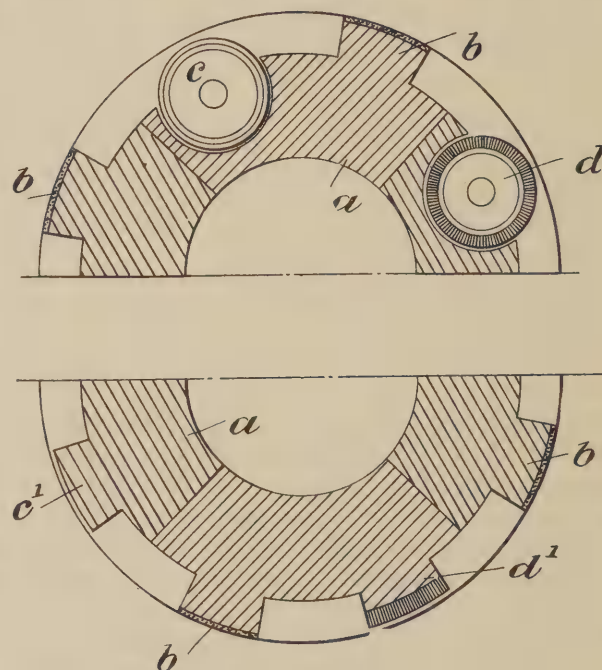
By the term lime hydrate found in the description and claims, inventors mean the product obtained by hydrating commercial lime, which usually chiefly consists of calcium hydrate  $[\text{Ca}(\text{OH})_2]$  but often con-

tains very substantial amounts of other substances among which may be mentioned magnesium hydrate.

### Machine for the Production of Suede Cotton Cloth (1,411,071; March 28, 1922)

JOHN DANIA TOMLINSON, Rochdale, England

The invention is an improvement upon one for which patentee has obtained Letters Patent No. 1,218,131 for the production of cloth to imitate "suede" leather, in which rollers are used which comprises bars or lags of wood covered with carborundum and stretching rollers or expansion bars, in the combination making up the complete roller. He finds in practice, that while the carborundum lags are effective and produce a good result on the surface of the knitted fabric of fine Egyptian cotton, such carborundum surfaces individually tend to produce somewhat lengthy fibers, like hairs, on the surface



of the cloth. Such lengthy fibers are not necessarily got rid of by the next carborundum covered lag but their removal may require the successive action of several lags thus to some extent interfering with the "sueding" action by their very presence. As a result of this it may be necessary or desirable to pass the fabric more than once over the complete "sueding" roller or over more than one such rollers or otherwise to control the speed or running of said roller. Such fibers or hairy lengths produced by one lag are not necessarily got rid of by a succeeding carborundum covered lag although the end is ultimately accomplished. A too drastic action of the lags may produce a streaky result which is to be avoided.

It is proposed to apply to the "sueding" roller comprising a number of carborundum covered lags or bars and having rollers or bars, or other devices for maintaining the cloth in its curved form when traveling on the roller, one or more needle or wire covered surfaces to

assist the action of the carborundum and to produce a better surface on the cloth. A needle or wire covered surface can be ground to a uniform face whereas a carborundum surface is necessarily uneven.

By means of the needle or wire covered surface, operating in co-operation with a carborundum surface, such projecting fibers are caught as the cloth passes thereover, and a more uniform suede surface is produced.

The accompanying drawings show, respectively: Above, a cross section of the upper half of a "sueding" roller in which is indicated a rotary needle or wire covered surface, and also a rotary stretching roller combined with carborundum covered lags; below, the lower portion of a sueding roller indicating a lag provided with a needle or wire surface, and also a stretching bar or lag and carborundum covered lags.

The sueding roller is or may be built-up of segments *a* provided at intervals around its periphery with bars or lags *b* covered with carborundum. Between such carborundum surfaces *b* are disposed alternately a stretching roller *c*, or stretching bar *c'*, and a needle or wire covered roller *d* or needle or wire covered bar *d'*. The needle or wire covered surfaces *d* are located between two carborundum covered lags *b* on or about the "sueding" roller periphery so as to come into action after a carborundum covered lag *b*, the intention being that the needle or wire covered surfaces shall so act on or influence the projecting fibers or hairy lengths which may be produced by a carborundum bar that the same are removed by the action of the succeeding carborundum bar and the fabric will then be straightened out by a stretching roller or bar. At present it is proposed to employ card or other wire or needle surfaces arranged around a roller surface or in strips or lengths, or otherwise upon a lag or bar, say in the space between any two carborundum lags or between such a lag and a stretching device as may be found most suitable.

There may be used only one such needle covered surface per roller or a number of succeeding ones, the series being distributed throughout the roller in the manner found most effective. Provision may be made for adjusting such needle covered surface with respect to the periphery of the complete "sueding" roller. Also with a view to obtaining an additional lateral stretching or straightening effect upon the fabric, the needle or wire surface may be disposed spirally from the center outwards on the roller, or at the desired angles on the non-rotary lag to have the same effect as far as possible upon the fabric as the stretching rollers or bars.

#### Dyestuffs of the Indigo Series

(1,412,038; April 11, 1922)

MAURICE BOUVIER, Lyon, France (assignor to Societe Chimique des Usines du Rhone, Paris, France)

The dimethyl-indigo, the methyl groups of which are in the para position with respect to the imino group, is derived either from the 1-nitro-4-methyl-6-benzaldehyde by condensation of the latter with ace-

tone in an alkaline medium (J. Koetschet, "Revue des Matieres Colorantes," Vol. 5, p. 160, 1900), or from the alkaline melting of para-tolyl-glycine by the modified Heumann process. This coloring matter has not been adopted in practice owing to the dull shades with which it dyes wool or cotton.

The patentee has discovered that the properties of the said coloring matter are entirely modified by the introduction of one or two atoms of a halogen.

The halogenation can be performed by any one of the known methods. Several of such methods are given, for instance, by Richter, "Traite de Chimie Organique," Vol. 11, Paris, 1918, such as direct halogenation of indigo in the absence of water, in a hot benzenic solution, in concentrated sulphuric acid solution or in cold chlorsulphonic acid.

The p-p'-tolyl-dibromindigo-(5-5'-dimethyl-dibrom-indigo) has the appearance of a dark blue powder similar to the p-p'-tolyl-indigo. Its trace has a beautiful coppery sheen. Its properties are as follows:

In solution in--	Color of the Solution
Cold concentrated sulphuric acid.	Green.
Hot concentrated sulphuric acid at 100 deg. Cent.	Bluish green, sulphonated with difficulty.
Cold aniline .....	Green.
Boiling aniline .....	Very sharp blue.
Cold nitrobenzene .....	Blue, slightly greenish.
Boiling nitrobenzene .....	Blue, purple by transmitted light.
Chloroform .....	Little soluble, blue, slightly green.
Acetone .....	Little soluble, blue, slightly purple.
Benzene .....	Little soluble, purple blue.
Alcohol .....	Little soluble, blue green.
Carbon tetrachloride .....	Little soluble, purple blue.
Carbon sulphide .....	Little soluble, blue.
Acetic acid .....	Blue.
Hydrosulphite vat .....	Greenish yellow.

It is reduced by hyposulphite of soda in an alkaline solution in a similar manner to p-p'-dimethyl-indigo. But it behaves in an entirely different manner toward textile fibers, vegetable and animal.

The product is a dye both for cotton and for wool. It is therefore only to be compared with the ordinary di- and tri- bromindigos, the higher derivatives not being adapted to dye animal fibers.

On cotton the shades it gives are of a very decided and sharp blue, less reddish than those given by the dibromindigo and very different from those of the tribromindigo, which are very greenish. It covers and unites very well; its affinity is to be compared to that of the tribromindigo, which is very good; it is very superior to that of the dibromindigo.

While the di- and tri- bromindigos have but little sheen on cotton, our product has a relatively strong sheen similar to that of the tetra-bromindigo (Ciba 2 B blue).

On wool it is still more remarkable than on cotton; the dyes obtained by its means are extraordinarily sharp; its affinity exceeds that of the dibromindigo, which is considered as being very good and which is



the best of the series of the ordinary indigos; it exceeds also that of its orthomethylated isomer. It dyes wool in the darkest shades in one dip; the tints are comparable in sharpness with those of the finest acid dyes (Alizarine Blue, for instance). The p-tolyl-brom-indigo dyes wool in the same tone as cotton, which is not quite attained with dibromindigo and far from being the case with tribromindigo.

To sum up, the introduction of the halogen in the molecule of the p-p'-dimethylindigo enhances considerably its affinity for wool and for cotton, as well as its coloring power; it modifies the shade of the tints and renders them more sharp and decided.

The mono-brominated derivative has similar properties, but less developed, being intermediate between those of the p-p'-dimethylindigo and those of the derivative above described.

### Process for Decomposing Soapy Waters

(1,410,882; March 28, 1922)

CHARLES BOUILLON, Paris, France

This invention has for its object a process for decomposing soapy waters into their primary elements, viz. fatty acids and mineral salts.

According to this invention a soapy water is treated with carbonic acid. The soap is decomposed, the free fatty acid being liberated, while the mineral salt becomes

carbonates. The inverse reaction, viz. the reconstitution of the soapy matter is prevented by an excess of carbonic acid which maintains an acid medium in which the reaction cannot take place.

It is well to take precautions for preventing such reaction taking place when the operation is complete and for this purpose preventing the decomposition of the bicarbonate in the presence of the fatty acid obtained. Such decomposition can take place under the influence of heat after the separation of the excess of carbonic acid.

For this purpose, at the termination of the operation, the carbonic acid in solution is expanded to the atmospheric pressure which lowers the temperature of the mass and further allows the separation of the carbonic acid in excess and the liquid.

In this process the decomposition of the soapy waters may take place in a continuous manner in which case the process forms a true cycle; after expansion the carbonic acid is recovered and again compressed to react with still undecomposed waters.

Any suitable apparatus may be employed for carrying out the process.

An apparatus for carrying out the continuous process with the aid of heat is illustrated in elevation in the drawing.

The apparatus comprises a mixer *a*, a container *b* in communication with a carbonic acid compressor *c* and a pump *d* compressing the soapy waters.

The mixer *a* is formed in principle of a closed tube *e* heated by steam led into a casing *f* through the inlet *m*, *n* being the outlet for condensed water; within the mixer is a tube *g* provided with holes. The tube *e* receives soapy liquid coming under the pressure of the pump *d* through the pipe *h*; the tube *g* receives carbonic acid compressed by the compressor *c*. The carbonic acid in expanding in the liquid mass mixes and agitates it continuously.

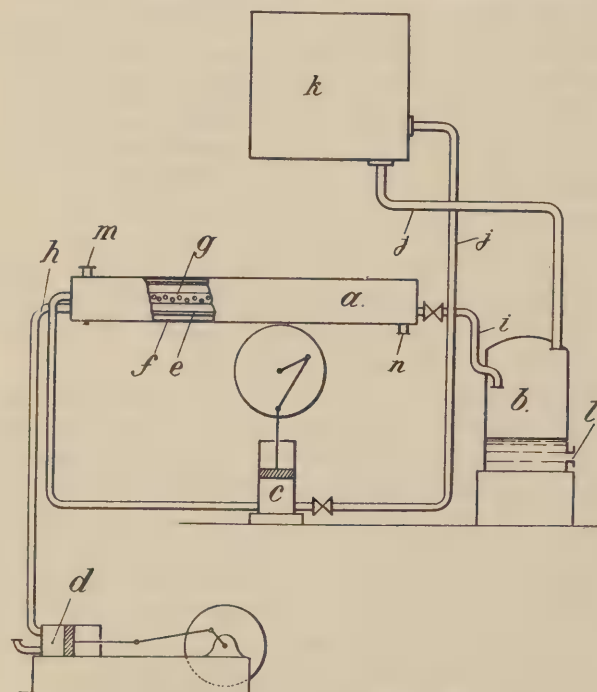
A container *b* communicates both with the mixer *a* through the pipe *i* through which expansion takes place and also through the pipe *j* with the suction of the carbonic acid compressor *c*. It is provided with an outlet *l* for the fatty acid and the mineral solution.

The carbonic acid passes to the compressor *c* from the reservoir *k*.

Of course, the decomposition of the soapy waters may be effected in a discontinuous manner by successive operations without recovering the carbonic acid.

This process is more particularly applicable for the decomposition of residual soapy waters derived from washing wool which have been almost completely freed by a preliminary operation from the grease they contain; such waters contain a small quantity of residual grease, organic matters and mineral salts derived from washing wool.

The treatment with carbonic acid has the advantage of not attacking the organic matters, i. e. not oxidizing them as will take place when sulphuric acid or hydrochloric acid is employed. The employment of such acids



dissolved in the water. Under pressure decomposition sets in rapidly, the rapidity of the action being greater if the operation takes place with heat and with continual agitation of the liquid to be decomposed so as to ensure constantly renewed contact between the liquid and the carbonic acid.

Under these conditions carbonic acid forms with the mineral salts in solution in the water carbonates and bi-

gives rise to fatty acids contaminated with carboniferous matters which can only be removed by distillation. The treatment with carbonic acid produced on the contrary acids free from carboniferous matters. It is more advantageous to employ as mineral salt the carbonate corresponding to the base of the soap employed for the washing of the wool, such carbonate may be evaporated in a suitable furnace together with that derived from scouring, i. e. from the preliminary washing of the wool.

#### **Brown Dye and Process of Making Same**

(1,412,707; April 11, 1922)

WILLIAM B. RICHARDSON, Wilmington, N. C.

The present invention relates to the production of dyes by the treatment of dihydroxynaphthalene, and in this operation it is preferable to employ the 1-5-dihydroxynaphthalene, which may be produced in any suitable manner, and which may readily be obtained in a pure condition. The dihydroxynaphthalene is treated with concentrated nitric acid, the reaction mixture being preferably kept cold during the reaction and the mixture, after the addition of nitric acid, preferably being allowed to stand in the cold for several hours or overnight. If a highly concentrated nitric acid is employed—for example, one having a specific gravity of about 1.42—then it is necessary to keep the temperature low during the reaction. If a considerably weaker acid is employed, it is not necessary to keep the reaction mixture cold.

As a specific example of the process the following is given: 5.5 parts, by weight, of 1-5-dihydroxynaphthalene was slowly added with constant stirring to 54.6 parts, by weight, of nitric acid of 1.3 specific gravity. The stirring was continued for an hour; then 7 parts, by weight, of 1.42 specific gravity nitric acid were added and the mixture well stirred. The mixture was then allowed to stand for about thirty minutes. The reaction products were then poured into 100 parts or more of water; the solid reaction product was thereby precipitated, separated from the dilute acid by filtration and washed with water a number of times. A reddish brown product was obtained, whereas the original dihydroxynaphthalene used was of a somewhat grayish color. During the treatment it was not necessary to watch the temperature carefully, and the solution warmed up slightly during the operation.

The brownish pulverulent product is insoluble or only very slightly soluble in water, and in dilute nitric and sulphurous acids, but is very soluble in alkali solutions such as ammonia and sodium carbonate. It dissolves or decomposes and goes into solution in nitric acid of 1.42 specific gravity, and is not reprecipitated by the addition of a large quantity of ammonia water. The product does not seem to be entirely uniform, several samples having been tested giving a percentage of nitrogen between 3.75 and 5.5, and the latter percentage is somewhat lower than the theoretical per cent of nitrogen in mono-nitro-1-5-dihydroxynaph-

thalene. These analyses were made by standard fertilizer methods; and although they show absolutely that there is as much as 3.75 per cent, they do not absolutely prove that there is not more than 5.5 per cent nitrogen, since some of the nitrogen may have been lost during the analysis.

In a different example of the process, a considerably stronger nitric acid was employed. During this operation it was necessary to cool the mixture during the reaction to prevent decomposition of the product. Patentee is not prepared to give a structural formula of the product, but believes that the same is a nitro-derivative.

The reddish brown material forming the product dyes unmordanted silk a brilliant light brown, dyes unmordanted wool a somewhat darker shade of brown, and dyes tannin-mordanted cotton a grayish brown.

Claims include the following: A dyestuffs constituting a reddish-brown solid material capable of dyeing unmordanted silk a brilliant light brown color, capable of dyeing unmordanted wool a slightly darker shade of brown, and capable of dyeing tannin-mordanted cotton a grayish brown color, which dyestuff may be prepared by reacting upon a dihydroxynaphthalene with nitric acid.

#### **Method of Producing Alkyl Anilines**

(1,413,494; April 18, 1922)

HOMER ROGERS, Wilmington, Del. (assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.)

This relates particularly to a process for producing alkyl anilines, but especially dimethylaniline by the treatment of aniline and methyl alcohol with an alkylphenylammonium iodide.

The object is to provide a process of this character by means of which alkyl anilines—as, for example, dimethylaniline—may be advantageously produced by the action of a compound containing iodine, and especially an alkyl iodide on aniline and an alcohol. A further object is to provide a process of this character in which the catalyst present is an alkylphenylammonium iodide such as trimethylphenylammonium iodide.

A further object is to avoid the loss of iodine which occurs when uncombined iodine is used as a catalyst, thereby avoiding the great expense incident to the loss of such an expensive catalyst.

A further object is to avoid the necessity of separating out the uncombined iodine at the end of the process where uncombined iodine is the catalyst used. The recovery of such uncombined iodine has necessitated the distillation of the alcohol water layer containing the same so as to recover the methyl alcohol present, and then the evaporation of the residue to dryness, after which the residue was subjected to treatment with sodium nitrite and sulphuric acid, then to filtration to obtain the crude iodine; the latter was finally purified by resublimation. Inventor holds that



it is not necessary thus to separate out the iodine, since alkylphenylammonium iodide, which is produced in the process, may be used subsequently as a catalyst.

For example: A quantity of aniline and methyl alcohol is mixed together with a small amount of methyl iodide in the following proportions: 93 parts aniline, 96 parts methyl alcohol, 1.35 parts methyl iodide.

The amount of the methyl iodide required is much less than would be required if the reaction were one of mere methylation so that the proportion of iodide may be said to be substantially less than a molecular proportion. Its function is that of a catalyst. After the reaction is started the dimethylaniline formed from the methyl alcohol and aniline by the catalytic action of the methyl iodide combines with at least part of the methyl iodide to form an addition compound. This compound formed by the combination of methyl iodide with dimethylaniline is trimethylphenylammonium iodide and performs the same function as does the methyl iodide itself. The treatment is carried out in a digester at an elevated temperature. The liquids contained in the digester separate into two layers, one containing crude dimethylaniline and the other the excess of alcohol, together with water formed in the reaction and the trimethylphenylammonium iodide. The two layers are separated from one another and the layer containing the catalyst which is dissolved in water is first heated in a still in order to recover the methyl alcohol present and the residue is evaporated to dryness to recover the trimethylphenylammonium iodide usually mixed with small amounts of other substances. The trimethylphenylammonium iodide, from which the other substances may or may not have been removed, is then ready for further use in making a methyl aniline from aniline and methyl alcohol. If desired, the process may be begun by the application of this compound as a catalyst instead of methyl iodide. Other compounds of iodine act in a similar way. For example, hydrogen iodide or ammonium iodide have been found to serve the purpose instead of methyl iodide.

The present invention is an improvement on the process described and claimed in the application of Arthur E. Houlehan, Serial No. 179,228; this latter application is directed broadly to a process of making alkyanilines in which iodides are used as catalysts, and specifically to the steps of a two-cycle process in which methyl iodide is used in the first cycle, and a mixture of iodides obtained as a by-product from the first cycle is used as the catalyst in the second cycle. The present invention is directed to a process of making alkyanilines in which the catalyst is trimethylphenylammonium iodide.

Alpha Silk Company, Paterson, N. J., is reported to be contemplating the building of an additional plant to be used as a dyehouse.

## Review of Recent Literature

*Some Observations on the Behavior of Oxidized Cellulose.* Edmund Knecht and F. P. Thompson, M.Sc.Tech.; Jour. Soc. Dyers & Colourists, XXXVIII, 5, May, 1922, p. 132.

Authors find that in the initial stages of oxidation of cellulose by permanganate in cold acid solution, the rise in copper number is nearly proportional to the amount of oxidant used up. After the use of a half-atomic proportion of oxygen the rise in copper number is very gradual.

The acetylation of oxidized cellulose was not found to give any indication of the effect of oxidation on the hydroxyl groups of cellulose. This was due to the very great reduction in the yield; highly oxidized cellulose gives a high yield of water-soluble products on acetylation.

When nitrated under identical conditions, oxidized cellulose gives products containing considerably less nitrogen than cellulose, and it is inferred that oxidation results in a suppression of the hydroxyl activity.

Owing to the strong reducing action of the oxidized cellulose, it was not found possible to obtain a labile nitrate.

Ground covered includes the quantitative relation between the degree of oxidation and the reducing power, and the preparation of oxidized celluloses; estimating the copper number; the effect of oxidation on the ester reactions discussed under the headings "The Acetylation of Cellulose and Oxidized Cellulose" and "The Nitric Esters of Cellulose and Oxidized Cellulose."

*Transparent Effects on Cotton.* H. Forster, British Patent 162,627.

Mercer's original patent substantially covered the treatment of cotton fabrics with strong sulphuric acid at a low temperature or with strong alkali, and it has subsequently been proposed to alternate the treatment.

In the patent (162,627) of H. Forster, transparent effects on cotton are obtained by first treating cotton or mixed fabrics with a weak acid and subsequently with an acid of greater concentration, and are finally mercerized after this treatment with caustic lye, which causes the effect to appear.

The process is carried out, for instance, as follows: Cotton fabric is treated with weak sulphuric acid of 49 to 50 deg. Be. at a normal temperature for one to three minutes, being stretched at the same time or subsequently. It is then washed and dried under as

great tension as possible. After this the cotton fabric is treated with strong sulphuric acid of 52 to 54 deg. Be. for three to five seconds at a normal temperature, being kept under tension. Finally, the wet material is mercerized while being stretched in the usual manner with caustic soda of 36 to 40 deg. Be. for several seconds. Between and after the separate operations, the material may be washed and squeezed in the usual manner or dried.

The product obtained has a silky luster and shows a transparent effect.

Instead of using the same acid first in a weak concentration and subsequently in a stronger concentration, the treatment may be carried out with different acids, the preliminary treatment always being that with the acid of weaker concentration. Instead of weak sulphuric acid, phosphoric acid, hydrochloric acid, nitric acid, a solution of chloride of zinc, or a solution of copper oxide ammonia can be used, the degree of concentration of these substitutes, where that of the sulphuric acid is 49 to 50 deg. Be., being for phosphoric acid 55 to 57 deg. Be., for hydrochloric acid a specific gravity of 1.19, for nitric acid 43 to 46 deg. Be. at 60 to 70 deg. Cent., and chloride of zinc solution of 66 deg. Be. at 60 to 70 deg. Cent. The weak solution of copper oxide ammonia which may be substituted for weak sulphuric acid is prepared by mixing 10 grams copper sulphate, 90 grams water, 5 grams glycérine and 9.5 grams caustic potash.

Fabrics of pure cotton or mixed fabrics can be treated by this process. The effect obtained is transparent and like glossy silk. The material can be treated uniformly over the whole surface or in parts only to obtain figured effects.

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*Bleaching.* S. H. Higgins. Manchester, The University Press.

The bleaching industry, says Mr. Higgins in his introduction, was founded on empiricism, and chemistry has not yet fundamentally altered the processes used. A knowledge of chemistry cannot replace experience in the bleaching industry, but the author is not without hope that further investigations may enable chemistry to influence the introduction of systematic order in the bleaching industry. To this end he has reviewed in the present volume the research work that has been published during the period 1908 to 1920 bearing on the bleaching industry. He has had the advantage of a first-hand knowledge of the subject, and has planned out the work on ordered lines. He attaches importance to the possible good results which may be obtained from a study of the constituents of vegetable fibers. In another chapter he deals with scouring or the elimination of the non-cellulose constituents of the fiber. The elimination of waxes, of proteins, of mineral and pectic matters is dealt with, and then a chapter is given on the destruction of the coloring matter by oxidizing

agents—viz., bleaching proper. He examines the various theories of the bleaching action of hypochlorites. Other chapters are given on hypochlorites produced by electrolysis; cellulose and water; cellulose and strong alkalies; cellulose and acids; cellulose and oxidizing agents; and cellulose—the bleaching product. A final short chapter on bleaching faults is given. The book bears evidence of the pains and care expended in collecting the information given.—Through "Textile Manufacturer."

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## INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

L. D.—*Question:* What is the cause of the light streaks and clouds that appear so often on silk hosiery, and how may they be remedied?

*Answer:* In this case we will eliminate the possibility of uneven dyeing, as any irregularity in the dye would cause an entirely different appearance. The clouds mentioned are actually clouds of whitish appearance that seem to be on top of the color. Generally they are of two classes—one due to a sediment of insoluble matter, such as lime soap, precipitated silk gum or silica, and the second class to abrasions of the silk fiber itself. Needle abrasions follow the stitches vertically; dye bath abrasions are irregular. The best general remedy is to use only good soap for the boil-off, not to boil off too long, never boil or dye goods right side out and have the nets packed fairly full to prevent too much motion and tangles. We expect to cover this subject more fully in an article that is now in preparation.

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C. P. S.—*Question:* When pure mineral oil is used as a fiber lubricant, whether for wool spinning, silk throwing or to lubricate threads in knitting, can it be absolutely removed later so it will not interfere with dyeing?

*Answer:* If the oil is applied in its natural condition it can only be removed by extraction with solvents such as benzene, benzol, carbon tetrachloride, etc.; but if it has been applied in the form of a perfect emulsion



it may be removed to a great extent, at least so as not to cause any trouble, by the regular soaping operations. It is doubtful that a perfect emulsion can be made of mineral oil and soap, but a perfect emulsion can be made if there is present a small amount of free fat acid, such as oleic acid (red oil). By far the best emulsions are those that contain sulphonated oils, because when the water evaporates on the fibers and the oils separate they remain blended and require only water to restore the emulsion. Consequently they are more easily removed and, even if not entirely washed out, allow the penetration of the dye liquors.

J. O. H.—*Question:* How are the cheap black furs dyed that are used for trimming cloaks and capes?

*Answer:* We cannot give you an exact working formula, as the conditions vary according to the work. The skins are generally bark-tanned rather than chrome-tanned. Mordants of alum and iron liquor are used and the dye consists of varying amounts of hematine, fustic and gambier applied at 120 deg. Fahr. Often they are after-chromed. It has not been found practical to use the regular fur dyes for such work, although they are always used on the higher grade of furs.

E. M.—*Question:* How may washable shades be produced on viscose art silk yarn?

*Answer:* There is available a great number of sulphur dyes, all of which will dye at a low temperature on art silk without injuring the luster or fiber. These will answer for the heavier colors.

Primuline, developed with various developers, furnishes another series, to which we may add all the other developing dyes.

Then, there is a limited number of direct dyes which are made fast by after-chroming.

Finally, the vat dyes of either the anthracene or indigo series.

In every case it is, of course, necessary to finish the dyeing operation in as short time as possible, rinse clean and soap acidulate and dress up the skein to remove kinks before drying.

### INTERNATIONAL CHEMICAL CONFERENCE TO BE HELD AT LYONS

The general program of the Third International Chemical Conference, to be held at Lyons, France, June 27 to July 2, inclusive, includes meetings of the Council, reports of committees and visits to factories in the vicinity. On July 2 the delegates will go down the Rhone by boat to the neighborhood of Marseilles, where they will have an opportunity to attend the second congress of industrial chemistry, which has been arranged by the Societe de Chimie Industrielle.

This congress will be held July 2 to 7. Among the

general questions which will be considered are the animal, vegetable and mineral resources of the French colonies. In addition to this, fats, soaps, etc., will be discussed.

## Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated. Symbols: \*Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

2183.\*—The purchase is desired by a firm in Spain of cotton, woolen and silk goods, buttons, notions, travelers' articles and household supplies. Quotations desired c. i. f. Spanish port. Correspondence should be in Spanish. References.

2264.\*—A mercantile company in Australia wishes to secure agencies for the sale of artificial flowers, trimmings and ribbons for the millinery trade; hosiery and gloves, small tools, textile machinery and tin plate. Reference.

2268.\*—A commercial agent in Ecuador desires to secure the representation of firms for the sale of cotton piece goods. Quotations should be given c. i. f. Guayaquil or f. o. b. New York. Terms: Cash against documents. Correspondence desired in Spanish. References.

2228.\*—An agency is desired by a merchant in South Australia for the sale of cotton piece goods, manufactured cotton goods and men's wear. Quotations should be given c. i. f. Port Adelaide. Reference.

2229-2252.\*—Owing to the lack of space, a number of "foreign trade opportunities" pertaining to drugs and chemicals have been grouped and can be obtained by reference to these numbers.

2225.\*—An importing company in New Zealand desires to secure an agency for the sale of women's hosiery in pure silk, full-fashioned, lace, drop-stitch, em-

broidered, plain and fancy Milanese, and Italian silks in all the popular shades, medium and highest grades; artificial silk with mock seams, and seamless, cheap to medium class, all shades; silk gloves, in all shades and lengths, double tipped, all sizes, medium to better grades; and bandeaux, medium and better grades. Quotations should be given c. i. f. principal New Zealand ports. References.

2226.\*—A mercantile firm in Bulgaria desires to purchase tailors' supplies of all kinds, including cloth, lining, threads, buttons and padding, of all grades. Quotations are desired c. i. f. Varna, Bourgas or Sofia. Reference.

2292.\*—A manufacturer's agent in Canada desires to secure an agency for the sale of a good quality of women's silk hosiery. Quotations should be given f. o. b. shipping point. Reference.

2294.\*—An agency is desired by a merchant in the Canary Islands for the sale of textiles. Correspondence should be in Spanish. References.

2259.\*—A firm of commission merchants in Syria desires to purchase petrolatum, ammonium hydrate, alum, iron sulphate, magnesium sulphate, magnesium calcinated, nitric acid, sodium bicarbonate, castor oil, absorbent cotton, hosiery, handkerchiefs, shirts and like wearing material; and also secure an agency for the sale of alcohol, petroleum, benzine, sugar, rubber, leather, kid, box calf, candles, tin plate and coffee. Quotations desired c. i. f. Beirut and Haifa. Terms: Cash against documents at Damascus. Correspondence should be in French. Reference.

2260.\*—An agency is desired by a firm in South Australia for the sale of electrically operated machinery, self-contained lighting outfits and miscellaneous electrical equipment, and machines for handling fibers, such as flax, wool and wood. Quotations should be given f. o. b. San Francisco. Terms: Cash and draft. References.

2276.‡—A request has been received from a firm in Germany that it be placed in touch with exporters and manufacturers of chemicals, particularly caustic soda, with a view to securing agencies. References.

1969.\*—It is the desire of a mercantile firm in England to purchase from American manufacturers men's light summer underwear and fleecy winter underwear, and women's fleecy winter underwear (divided skirts and knickers). Quotations should be given c. i. f. English port. Reference.

1971.‡—A merchant in Mexico desires to secure the representation of manufacturers for the sale of men's

clothing, such as cotton, fiber and silk hosiery, skirts and underwear, ready-made clothing and neckties. References.

2053.\*—The purchase of silk stockings, fancy goods, notions, cutlery and tableware is desired by a wholesale dealer in Spain. Quotations are desired c. i. f. Spanish port. Correspondence should be in Spanish or French. References.

2025.\*—A commercial agent in Austria wishes to secure an agency and also purchase hosiery, textiles and rubber shoes and galoshes. References.

2167.\*—The purchase is desired by a merchant in Arabia of a fiber-stripping machine for cleaning sisal hemp. Quotations should be given c. i. f. Massowah. References.

2168.\*—An inquiry has been received from an agent in Italy for securing an agency on consignment for the sale of spinning and weaving machinery for woolen-cloth industry. Quotations desired c. i. f. Leghorn or Genoa. Correspondence should be in Italian, French or German. References.

2094.\*—A merchant in France wishes to purchase and secure an agency for the sale of silk and cotton goods, ribbons, veilings, gold and silver thread, real or imitation; raw goods and manufactured products, petroleum, industrial furnishings, and condensed milk and evaporated cream. Quotations should be given c. i. f. Havre. Terms: Payment against documents. Reference.

2146.\*—An agency is desired by a merchant in Syria for the sale of cotton and woolen goods, cotton yarns, sugar, alcohol, glucose, chemicals and wire nails. Quotations should be given c. i. f. Beirut, Haifa or Tripoli. Reference.

2101.\*—A merchant in Italy desires to secure an agency on consignment for the sale of a red oil suitable for use in conditioning woolen cloths, and lubricating oils. Quotations are desired c. i. f. Leghorn or Genoa. Correspondence should be in Italian, French or German. References.

2141.‡—An importing company in the Straits Settlements desires to secure the representation of manufacturers for the sale of rubber shoes, canvas shoes with white rubber soles, haberdashery, raincoats, boots and shoes; cotton, lisle thread and silk hosiery; embroidery; cotton ducks, piece goods; white poplin canvas for shoemaking; materials for shoemaking; leather; enameled and aluminum ware; aniline dyes; foodstuffs, such as canned salmon and sardines; fruits, meats and sweets; hardware, and tools. Quotations



are desired c. i. f. Singapore harbor. Samples should be forwarded, as dealers are adverse to indenting on mere catalogues. No reference given.

2163\*—A merchant in Italy desires to secure an agency on consignment for the sale of furnace coal and chemical products for use in woolen textile industry. Quotations should be given c. i. f. Leghorn or Genoa. Correspondence desired in Italian, French or German. References.

## NOTES ON THE DYEING OF DIRECT BLACKS ON COTTON PIECE GOODS

(Continued from page 402.)

reasons the field covered by direct blacks is very large, and these are still of very great importance, even in the most modern cotton dyehouses.

### THE DYEING OF JET BLACKS

When a direct black is produced with direct colors, several problems may present themselves. An undesired shade may have to be covered with the black, or this may have to be produced from the start on boiled-out gray material. In the first case, a small-scale trial will be necessary in order to determine which of the works' blacks can be used by itself—or with shading colors—for producing the desired shade of black, as the color already present on the material can influence this very greatly. When this point has been settled, the dyeing is proceeded with on a large scale, using a dye bath of the most convenient strength.

### A BOILED-OUT GRAY MATERIAL

When a boiled-out gray material is to be treated, the color may have to be produced only through the direct dyeing of a substantive black, through the dyeing and diazotizing of a black of the class of Direct Black BH, through the dyeing of a direct black fixed through chroming of the type of the benzo fast blacks, etc. The first black is the cheapest of the three, but not, however, the fastest. In this instance there is some difficulty in getting at the black which dyes in exactly the desired shade—which may be a brownish, a greenish or a bluish hue, or with none of these but instead a quite neutral shade.

If this is not available, the unsatisfactory black at the dyer's disposal will have to be shaded by stronger or weaker additions of shading colors, rendering the dyeing more costly and complicated on a large scale and often difficult for the foreman-dyer to produce exactly the same shade at different times. Besides the above difficulties, there are others that have to be overcome, and among these is the tendency of the direct blacks to bronze or to produce dull, shabby blacks; the non-resistance to alkalies which will be

necessary if the water is hard, and the impossibility of making the black produce more than a very dark gray.

From the above, therefore, it will be seen that the dyeing of a jet black with direct blacks requires a nice discrimination in the choice of the products on the market, and it may often take some time before the dyer can obtain just what he wants.

### THE DYEING PROCESS

As already indicated, the dyeing of jet blacks can be conducted with or without soda; few blacks can, however, be made to dye a jet black without the addition of salt. The dyeing of jet blacks is mostly conducted on the jigger, although in some works continuous dyeing machines and beam dyeing machines are also employed. Among the three systems of dyeing, the second is certainly the cheapest when properly conducted and when very large batches of material have to be treated. When there is already a large battery or series of jiggers at one's disposal and the dye works produces blacks together with other colors, and never above a certain number of pieces per day, these are always the most convenient means, especially if they are constructed for dyeing the fabrics with very short baths. Beam dyeing is convenient when small batches of material are to be treated in as little space as possible and with little employment of labor.

### ECONOMIZING ON DYESTUFF

It would be of advantage, in many cases, when dyeing continually, to treat the cotton fabrics first with a strong bath of the direct color containing no salt whatever, and then to complete the black by passing through another bath which should be kept as short as possible, and which should contain common salt and a given percentage of coloring matter. The first bath is caused to run slowly through for replacing all bath extracted, a given weight of salt being added at regular intervals for maintaining constantly within certain limits the density of the bath. In this way a good portion of the dye bath may be kept free of salt, while another small portion may contain principally salt and can be used over and over again, or for the exhaustion of the dye bath of a small lot of material after a convenient filtration.

### PLANT FOR JET BLACKS WITH SUBSTANTIVE COLORS

For conducting the above new process of dyeing jet blacks with substantive colors, a plant constructed on the principle shown in *Fig. 1* may be used to advantage.

This shows a very long vat of narrow width and separated into eight compartments (*a, b, c, d, e, f, g, h*), the first three of which (*a, b, c*) are employed for dyeing the cotton fabrics without salt, the fourth (*d*) for the treat-

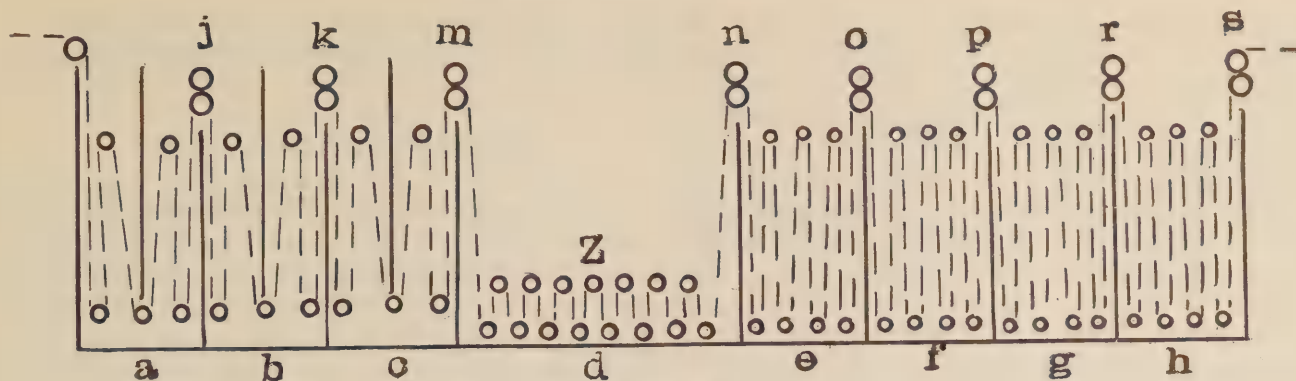


FIGURE 1

ment with salt, and the last four (*e, f, g, h*) for the recovery of the salt bath and the rinsing of the material. The first three vats (*a, b, c*) have each in their center an enameled iron diaphragm which divides them into two compartments having the same bath of treatment at their bottoms, each compartment being supplied with an upper and lower series of glass guiding rollers and having at its end a separation wall that is somewhat lower than the rest of the vat, and which is surmounted, so as to leave a free space in between, by a pair of glass pressing rollers (indicated in the three cases by *j, k* and *m*).

A similar arrangement causes the dye liquor, prepared in a separate vat at the back of the plant and entered at the top of the vat, to follow a zigzag course passing slowly below the separation diaphragms and above the lower separation walls, and ending in the fourth vat (*d*). This is of a certain width, and contains a double series of very low guiding rollers (*Z*), which remain below the strong salt bath destined to complete the dyeing. From the vat (*d*) all excess of dye bath passes out through an overflow tube, not shown in the sketch. The four following vats (*e, f, g, h*) are all of the same construction. The rinsing water enters, however, in the last of these (*h*), thence making its way slowly through the next and following vats. In vat (*e*) it escapes through an overflow tube.

The first four vats (*a, b, c, d*) are heated separately through a closed enameled iron serpentine coil, having a tap for the entrance of the steam and a steam trap for the elimination of all condensed water formed. For the introduction of the salt crystals the fourth vat (*d*) is supplied at one side with an entrance funnel, terminating in a distribution cylinder having a vertical agitator and placed in movement only when introducing the salt solution.

A small tap fixed in one of the sides of each compartment allows the drawing out of a small sample whenever necessary for controlling the work in each case and avoiding disagreeable surprises, such as the production of blacks of too little intensity, caused by a too rapid running through of the dye bath, a too strong reduction in the density of the salt bath, an imperfect treatment with the rinsing water, etc.

#### OPERATION OF THE PLANT

The working of the above plant would require a certain amount of experience at the start, which, once acquired, renders the operation easy and not fatiguing. When beginning work, the operatives first run through the empty vat a cotton tape, fixing to the end of this the end of the first piece to be dyed. When this operation has been conducted, they prepare the dye bath in a separate vat, enter the salt bath in the fourth vat (*d*), and initiate the passage of the running water through the four rinsing vats in the following succession: *h, g, f, e*, and regulating

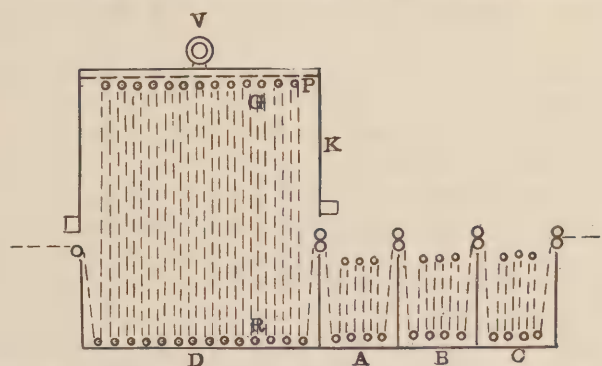


FIGURE 2

this so that through the overflow tube in the last vat very little water runs over.

At this point, steam is turned on in the steam coils in all compartments (*a, b, c, d*) and the plant is placed in operation. The cloth is thus entered in close succession, first through the first three vats (*a, b, c*), where, by coming continually in contact with the boiling dye bath and being pressed in between by the squeezing rollers *j* and *k*, it absorbs from the bath itself all coloring matter that can be fixed by the cotton material from the amount of the former employed; and when, after being pressed between the third pair of pressing rollers (*m*), it makes its way in the fourth vat (*d*) it already possesses a certain intensity of color, which varies, of course, in accordance with the nature of the direct coloring matter, or coloring matters, employed for the dyeing operation. In the fourth compartment the salt solution, containing a certain percentage of coloring matter, finishes off the dyeing operations, producing the jet black.



On making its way in the next compartment (*e*), the black fabric is rinsed with water containing a certain quantity of salt and coloring matter which is strongly increased, and on being pressed between the squeezing rollers (*e*) it enters nearly completely free from unfixed color in the next compartments (*f*, *g*, *h*), where it is treated three times with clear rinsing water, coming out ready to be further treated and dried. The water thus running through the different compartments (*h*, *g*, *f*, *e*) becomes little by little stronger and stronger in salt, the percentage of which can be regulated by increasing or decreasing its speed of entrance.

The salt bath escaping from the last compartment (*e*) is collected in an underground tank so as to be employed in the next dyeing operation and for dissolving any salt solution added to the bath in the fourth compartment (*d*). In this way, besides conducting the dyeing with economy, a good portion of the salt originally employed can be recovered.

#### DYEING WITHOUT SALT

Although some other direct coloring matters can be dyed without salt, especially when it is necessary to produce light and medium colors, or shades, only grays or blacks of unsatisfactory depth can be produced with direct blacks. There is no doubt, however, that many of such black colors could be dyed in the intensest shade without salt, if the material were treated with them on a special apparatus or machine where, during the coloring, the material is subjected to repeated dyeing and drying. In this way several layers of the black would be fixed on the material in a manner more or less analogous to that obtaining when the salt is added to the dye bath, which, in reality, brings about a gradual salting out of the dyestuff which deposits more and more on the material. For conveniently obtaining this result, however, mechanical assistance is necessary, and this is only possible through the use of a specially constructed machine in which everything has been regulated for making the process work to the best advantage. The principle of a machine that may be employed for the purpose is shown in *Fig. 2*.

This shows a long enameled iron vat containing a long compartment (*D*) for the dyeing or coloring operations and three compartments (*A*, *B*, *C*) for the rinsing operations. The first vat (*D*) has on its lower portion a long closed enameled iron steam coil, in which boiling water or steam is circulated when necessary. This compartment contains a long series of glass guiding rollers (*R*), turning a few inches above the steam coil and having a few yards above another series of guiding rollers (*G*), also of glass, which remain below a sort of enameled iron cover (*K*), the upper portion of which is supplied with a perforated ceiling (*P*) and with a powerful ventilator (*V*). The lower portion of the cover contains two dispositions, through which hot air prepared in a separate apparatus is introduced. The three compartments *A*, *B*, *C* are of equal size, and contain an upper

and lower series of guiding rollers. They are also supplied with squeezing rollers for rendering the treatment more effective.

#### OPERATION OF THE PLANT IN FIG. 2

For operating this plant, the operatives prepare the dye bath, which is caused to circulate slowly through the dye vat (*D*), entering at its end and escaping at its beginning. The cloth is then entered through the assistance of a long cotton tap, and is caused to run very rapidly and repeatedly between the dyebath and the drying chamber, fixing coating after coating on the material. In this way the material is colored to the darkest shade that the direct black can produce, and on making its exit at the end of the dye vat the rinsing waters that follow (compartments *A*, *B*, *C*) only eliminate the unfixed portion of the dyestuff.

#### ADVANTAGES OF THE MACHINE

The advantages of the above machine may not be apparent on first observation, as the new principle therein exhibited is quite unknown to many; some of the advantages can, however, be indicated as follows:

1—Owing to the rapidity with which the material is treated, it takes up with it a very large quantity of the dye bath, and this is compelled to fall back in the same while the cloth is reaching the upper guiding cylinders (*G*). In this way the deposition of the coloring matter is stronger.

2—The dye bath need not contain as much coloring matter as is usually necessary for producing a jet black, for the repeated partial drying of the wetted material brings about a concentration in the fabric itself of the former, which is deposited, layer after layer, in a manner more or less analogous to that taking place in the ordinary warm dye bath during the action in this of common salt or sulphate of soda crystals.

3—The bath in the dye vat need not even be warm if the direct black can remain in solution in it, or need only be toward 50 or 60 deg. Cent.

4—Through introducing a weak percentage of a thickening agent, with or without mineral additions, it is possible to thicken the material as well as to color it, thereby avoiding the necessity of a subsequent thickening or filling process and lowering the cost considerably.

5—The rapidity of the running of the material through the machine makes for a very strong production within a very short period of time.

6—The continuous running through of the material and the special arrangement of the plant require very little employment of labor, which consists merely in controlling the entrance and exit of the material, the preparation of the dye bath, the production of the hot air, the working of the ventilator and the operation of the guiding rollers.

7—Through regulating the speed at which the fabric is run in the dye bath and keeping this at constant

strength it is possible to change the intensity of the black produced, obtaining a light gray, a medium gray, a dark gray, a medium black and a jet black.

### STRENGTHENING COTTON

A process for increasing the strength of cotton, developed in a New York finishing establishment, has recently been patented. It is claimed that cotton yarns and fabrics may be considerably strengthened by removing the natural waxes and oily substances forming a part of the fibers, provided these substances are removed in such a way as not to impair the structure of the fibers. These waxes and oils tend to decrease the friction between the fibers or the capacity of the fibers to engage and hold each other when spun and woven, and their removal gives greater strength to the product.

The waxes and oily substances are removed either by emulsification or saponification. They can be readily removed, and the finished product materially increased in strength up to 25 per cent by dissolving them with ether, benzine, benzole or similar solvents. They can also be removed and a corresponding advantage obtained by subjecting the fibers for a sufficiently long period to soap, thus emulsifying and removing them, or they may be removed by saponification, by treatment with a weak solution of soda.

As the object of the process is to strengthen the product, it is essential that whatever treatment is employed shall not be carried to the extent of affecting and weakening the structure of the fibers themselves, as is always the case in bleaching operations. In bleaching operations the waxes and oils are incidentally removed along with the coloring matters and other impurities, but the fibers are weakened by the severe treatment. This weakening in the old bleaching operations is due primarily to oxidation of the cellulose into new compounds by the strong acid, alkali or other chemical baths required in bleaching.

In the new process the bath is so regulated that no oxidation with resulting weakening takes place. The degumming in process may be effected by a milder treatment than that required for the bleaching process.

Owing to the desirability of having the waxes and oily substances present during the spinning of the yarn, it is better to remove them either from the yarn or, where the finished product is not to be bleached, from the finished thread or fabric. In case the yarn is to be woven, decided advantage is derived by removing the waxes and oily substances; by doing this the yarn is materially strengthened, and it is possible to obtain a much tighter weave, this advantage remaining even though the fabric is bleached, so that substantially all coloring matters and other impurities are removed.

If the yarn is to be manufactured into fabric by some other process than weaving, treatment of the yarn is beneficial because this reduces the breakage of

the yarn during the manufacturing process and is of advantage even though there would be no advantage in securing a more compact fabric.

For ordinary gray goods the waxes and oily substances may be removed without injury to the fibers by extraction for one hour with commercial benzole at the boiling point of the benzole, or by boiling for three hours in a water solution containing 1 per cent of soap and 1 per cent of soda ash.—"Textiles."

### WILLIAM SESSO

William Sesso, who was connected with the Geigy Company, Inc., and its predecessors for more than twenty-five years, died at his home in Farmingdale, N. J., on May 19. In 1890 he took over the management of the Philadelphia branch of John J. Keller & Co., and when the company changed over to the Geigy Aniline & Extract Company he became secretary of the new organization. Before coming with Geigy he was in the employ of Kuttroff & Pickhardt and of Lutz & Movious. In 1917 he retired from active business.

His death occurred suddenly, in the sixty-second year of his age. He was one of the best known aniline salesmen in the Philadelphia district, and one whose genial ways and charm of manner endeared him to all with whom he came in contact. His funeral was held on Monday, May 22, from the Church of St. James the Less, at Falls of Schuylkill, Pa., and was attended by a host of friends who mourn his loss.

### NEW U. S. BUREAU OF MINES PAPER REPORTS ON ANTHRACENE

Anthracene is not usually produced in small tar works except as it exists in the anthracene-oil fraction obtained in distilling tar, according to W. W. Odell, fuel engineer of the Bureau of Mines, in Technical Paper 268, just issued. In such plants it is common practice to include this fraction with the creosote fraction, thereby enhancing the value of the latter as a wood preservative.

The crude product is obtained by cooling the anthracene-oil fraction and allowing the solids to separate and the oil to drain off. After the oil is drained from the solids, the latter are bagged and pressed or "whizzed" (centrifuged) to expel the oil still retained with the solids. This crude anthracene is usually sold as such. It amounts to about 5 or 10 per cent of the total distillate fraction from which it was obtained and contains approximately 15 to 35 per cent of anthracene. Different tars yield different amounts of anthracene. To purify the crude product further, it is either ground and agitated with hot solvent naphtha and drained, or is washed in a whizzing process with solvent naphtha. The dried product made in either way contains approximately 70 to 80 per cent of anthracene.

A high-grade commercial anthracene is sometimes prepared by redistilling the crude anthracene oil obtained in



the distillation of tar and separating a fraction that includes the distillate with a specific gravity higher than 1.07 at 60 deg. Fahr., the change or "cut" being made when the distillate coming over has a specific gravity of approximately 1.25 to 1.30 at 60 deg. Fahr. This fraction is cooled, drained of oil, pressed and washed, and sometimes sublimed. The sublimation process is like

that employed for purifying naphthalene except that the enclosed anthracene pans are heated by direct fire and superheated steam is blown directly on the melted anthracene and a water spray is used to condense the product. The commercial grade of anthracene is known as 80 per cent anthracene. Its further treatment is left to the alizarine works or other chemical plants.

## Exchange Fluctuations Upset Italian Dye Markets, but Bank Crisis Passes

Banca Italiana di Sconto Replaced by Banca Nazionale di Credito—Cheaper Coal, Raw Materials, and Better Power Facilities Aid Situation—Sales of Common Salt Masquerading as Dyestuff Continue Flourishing—Private Dyestuff Quotations

By RAFFAELE SANSONE

Genoa, May 5.  
Special to The REPORTER.

**C**ONDITIONS during the month of April were upset by wide variations in the value of the Italian lira, which changed the United States dollar as follows: Lire—19.50, 18.70, 19.11, 18.35, 18.49, 19.50 and 18.50, respectively on the 1st, 4th, 7th, 15th, 20th, 25th and 30th of the month; the English pound sterling as follows: Lire—83.50, 82.71, 84.24, 81.27, 81.26, 84.50 and 83; and the German mark as follows: Lire—0.05, 0.06, 0.06, 0.06, 0.07, 0.08 and 0.07. The French franc remained between 1.70 lire and 1.80 lire.

The financial difficulties created by the crisis of the Banca Italiana di Sconto, which temporarily withdrew

from circulation several milliards of lire in capital, were finally solved by the legalization of the agreement reached between the creditors and the old bank. The new bank formed (Banca Nazionale di Credito) will soon make the first payments, rendering possible a greater activity in many industries which had been suddenly crippled by the panic.

### THE DEMAND FOR COLORING MATTERS

The sale of dyestuffs of all sorts continued as usual, the products mostly demanded being the basic colors, the direct colors and the sulphur colors. Other colors in fair demand were Indigo (national and synthetic),

TABLE I

	April 1		May 1	
	(lire)	(dollars)	(lire)	(dollars)
Methyl Violet .....	70,000—80,000	3,589—4,102	70,000—80,000	3,743—4,278
Naphthol Yellow .....	50,000—70,000	2,563—3,589	50,000—70,000	2,673—3,743
Auramine .....	70,000—80,000	3,589—4,102	70,000—80,000	3,743—4,278
Orange II .....	30,000—35,000	1,537—1,794	25,000—28,500	1,336—1,524
Nigrosine, water soluble.....	30,000—40,000	1,537—2,051	30,000—40,000	1,604—2,139
Nigrosine, soluble in spirits.....	35,000—40,000	1,794—2,051	35,000—40,000	1,871—2,139
Sulphur Black .....	7,000—10,000	359—512	8,000—10,500	427—561
Acid Black .....	35,000—40,000	1,794—2,051	31,000—35,000	1,657—1,871
Direct Black .....	35,000—40,000	1,794—2,051	31,000—35,000	1,657—1,871
Chrome Black .....	40,000—45,000	2,051—2,307	35,000—38,500	1,871—2,058
Methylene Blue .....	80,000—100,000	4,102—5,126	80,000—100,000	4,278—5,347
Direct Blue .....	25,000—30,000	1,281—1,537	24,500—28,000	1,310—1,497
Sulphur Blue .....	45,000—50,000	2,307—2,563	34,500—38,000	1,844—2,032
Malachite Green .....	80,000—100,000	4,102—5,126	80,000—100,000	4,278—5,347
Acid Green .....	60,000—70,000	3,076—3,589	60,000—70,000	3,208—3,743
Direct Green .....	50,000—70,000	2,563—3,589	42,000—55,000	2,246—2,491
Bismarck Brown .....	40,000—50,000	2,051—2,563	36,000—42,000	1,925—2,246
Magenta (Fuchsine) Crystals.....	70,000—80,000	3,589—4,102	70,000—80,000	3,743—4,278
Eosine .....	60,000—80,000	3,076—4,102	60,000—80,000	3,208—4,278
Ponceaux .....	35,000—40,000	1,794—2,302	32,500—38,500	1,738—2,058

chrome colors, acid colors, alizarine colors, ice colors, etc. A certain increase was noted in the production of diazotized blacks, both on cotton socks and on cotton cloth.

mon salt containing only limited quantities of dye-stuff. Mixtures of dyes with soap are little known in Italy.

### ITALIAN COLOR WORKS

The Italian color producers were favored during the month by much cheaper coal and raw materials, by an abundance of electric power, and also by the fact of there being little change in the price of the war reparation products and other colors offered on the market. A certain increase in the sales of dyestuffs for the dyeing of old clothes, as well as for internal domestic purposes, was noted, owing to the serious financial difficulties suffered. The dyestuffs sold for domestic uses were composed principally of large volumes of com-

### PRICES OF COAL-TAR DYES

The quotations of war reparation dyes in *Table I*, per ton in lire and dollars, show the great difference wrought by the lower United States exchange prevailing at the moment of writing, in comparison with the prices on the first days of April, and small differences that have followed in the quotations of war reparation products.

### MORDANTS, ASSISTANTS, DYEHOUSE PRODUCTS

The greater part of business in these products was

TABLE II

	—April 5—		—May 5—	
	(lire)	(dollars)	(lire)	(dollars)
Acetate of alumina.....	1,600	82	1,600	85
Chrome alum .....	3,000	153	3,000	160
Bichromate of potash.....	6,000	307	6,000	320
Ferrous sulphate .....	500	25	500	26
Copper sulphate .....	2,250	115	2,250	120
Tartaric acid .....	12,000	614	12,000	640
Aniline oil .....	10,000	512	10,000	534
White refined glycerine.....	9,000	461	9,000	481
Glucose, 45 def. Be.....	3,600	184	3,900	208
Hydrogen peroxide .....	2,100	107	2,100	112
Tannic acid, 60 per cent.....	20,000	1,024	20,000	1,069
Tartaric acid, crystals.....	10,750	551	10,750	571
Acetic acid, 30 per cent.....	2,800	143	2,800	149
Hydrochloric acid, 20-21 deg. Be.....	300	15	300	16
Formic acid .....	11,000	564	11,000	587
Lactic acid, 80 per cent.....	4,000	205	4,000	214
Alum .....	1,000	51	1,000	53
Ammonia, 22 deg. Be.....	1,450	74	1,450	77
Bisulphite of soda, 32 deg. Be.....	400	20	380	20
Chlorate of potash.....	3,100	159	3,100	165
Chloride of ammonia.....	5,000	256	5,000	267
Bleaching powder .....	900	46	900	48
Nitrite of soda.....	3,100	159	3,200	171
Yellow prussiate of potash.....	13,000	666	13,000	695
Yellow prussiate of soda.....	9,000	461	9,000	481
Caustic soda, 70/72.....	2,100	107	2,000	106
Silicate of soda, 140 deg. Tw.....	1,000	51	1,000	53
Sodium sulphide .....	2,600	133	2,500	133
Logwood extract .....	10,000	512	7,500	401
Yellow dextrine .....	3,500	179	3,600	192
White dextrine .....	3,800	195	4,000	214
Farina .....	3,250	161	3,400	181
Kordofan gum .....	4,900	251	4,900	262
Indigo, 25 per cent.....	22,000	1,128	22,000	1,176
Beta-naphthol .....	18,000	923	18,000	962
Industrial castor oil.....	5,000	256	4,800	256



conducted in northern and middle Italy, and principally in the regions of Lombardy, Piedmont, Liguria, Veneto and Tuscany. Some of the dollar quotations are given, per ton at Milan, in *Table II*.

#### PRIVATE DYESTUFF QUOTATIONS

Some private quotations for dyestuffs at Genoa were as follows per kilo, showing the struggle against the war reparation products: Nigrosine in crystals, 26 to 30 lire; Sulphur Black, 7 to 10 lire; Chrome Black in powder, 35 to 38 lire; Acid Black, 35 to 36 lire; Direct Black, 35 to 36 lire; Sulphur Blue, 45 to 50 lire. Chrome Red in paste, 80 to 100 lire; Direct Black, 50 to 55 lire; liquid Fustic extract, 7.50 to 7.60 lire; Logwood extract, 7.50 to 7.70 lire; Hematine crystals, 8 to 8.15 lire.

#### DU PONT ANNOUNCES PONTACHROME BLACK SW AND SWB, PONTAMINE FAST BLUE L, PONTACYL FAST YELLOW G, NAVY BLUE 3R CONC. AND NAVY BLUE R CONC.

New products announced by the Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., Inc., include Pontachrome Black SW and Pontachrome Black SWB, Pontamine Fast Blue L, and three Pontacyl colors designated respectively as Pontacyl Fast Yellow G, Pontacyl Navy Blue 3R Conc. and Pontacyl Navy Blue R Conc.

Pontachrome Black SW and SWB create a valuable addition to the company's line of chrome colors which leave silk-effect threads unstained. The SW produces a jet shade and the SWB produces a bluish shade. These products are level dyeing, possess good solubility, and are therefore suitable for dyeing in machines. It is expected by their makers that they will be greatly appreciated for dyeing piece goods with silk-effect threads. They are very good in their fastness to light, water, washing, steaming, rubbing, carbonizing, stoving, fulling, perspiration and street dirt.

Pontamine Fast Blue L is in its shade close to Solamine Blue, but is slightly brighter and greener. A notable attribute of this product is its great fastness to light for a direct dyeing product. Not being sensitive to acid, it may be dyed on silk from an acid bath.

Pontacyl Fast Yellow G is an acid yellow. It corresponds with the company's Pontacyl Fast Yellow Y, but is greener in shade. Before the war this product was widely used, owing to its good fastness, even dyeing qualities and solubility. Its even dyeing qualities are retained when added to the boiling dye bath. It is suitable for combinations in addition to being used for self-shades.

Pontacyl Navy Blue 3R Conc. and Pontacyl Navy Blue R Conc. are acid colors producing excellent bloomy shades of blue with the usual, very desirable, overhand tone. They are particularly suitable for dye-

ing ladies' dress goods in the piece. Their fastness is good to street dirt, steaming, light and rubbing, and perspiration, all of which are essential for the purpose mentioned. Their solubility is good and they have excellent level dyeing properties.

#### CHROME COLORS ON COTTON HANKS

By R. K. Sheth

Chrome colors are dyed only on cotton. The yarn is first well boiled (no soda ash or caustic is used) in a kier for eight to ten hours, rinsed well and hydro-extracted. The hanks are taken on sticks. The yarn is piled on the sticks in two lots equally separated from the middle. In all operations of dyeing chrome yellow and orange usually three turns are given to the yarn by hand in a cold solution.

*Lime Water*.—Usually quicklime is employed. In a settling tank lime water  $1\frac{1}{2}$  deg. Tw. is prepared.

*Stock Liquor*.—For dyeing one bale of 400 pounds of yarn, 60 pounds of brown sugar of lead and 30 pounds of litharge are dissolved in 10 gallons of boiling water and allowed to settle. The liquor should be 105 deg. Tw.

To produce a bright reddish yellow and orange, seven wringing posts are put up in one line, beneath which wooden tubs of suitable dimensions to dye one bundle of 10 pounds of yarn at a time are arranged.

#### CHROME YELLOW

(1) The yarn is passed through lime water  $1\frac{1}{2}$  deg. Tw. and wrung; (2) passed through stock liquor solution diluted to 10 deg. Tw. with cold water and wrung; (3) again passed through next tub of lime water  $1\frac{1}{2}$  deg. Tw. and wrung; (4) again taken in lead bath freshened with stock liquor to the same strength and wrung; (5) passed through chrome bath prepared by dissolving  $1\frac{1}{2}$  pounds of bichromate of soda for each bundle of 10 pounds of yarn and wrung; (6) again turned in freshened lead bath and wrung; and (7) passed through chrome bath prepared as above and freshened from time to time. The yarn is finally passed through a hot hydrochloric acid bath containing 1 part of hydrochloric acid 32 deg. Tw. and 300 parts of water, soaped and dried.

#### CHROME ORANGE

To produce a bright chrome orange shade on yarn, instead of passing the chrome yellow yarn through an acid bath it is washed in clear water and passed through diluted boiling lime water, soaped and dried. The colors thus obtained are fast to washing and light.

#### CHROME GREEN

Chrome green is obtained by topping light indigo

blue with chrome yellow. Many direct cotton colors are on the market resembling chrome yellow and orange and green, but chrome colors are largely employed because the yarn becomes heavily weighted.-- "Indian Textile Journal."

### **NATIONAL NEWS BULLETINS DESCRIBE NATIONAL PURE SOLUBLE BLUE, A AND B, AND NATIONAL CLOTH RED 2R**

Two of the dyes recently announced by the National Aniline & Chemical Company, Inc., are National Pure Soluble Blue A and National Pure Soluble Blue B, which should be of interest to manufacturers of cotton, silk and paper, but especially to manufacturers of Gallo Tannate of Iron writing fluids, for which both of these dyes are particularly adapted.

National Pure Soluble Blue B will also find considerable use in the production of bright blues on leather, chip, straw, vegetable ivory and feathers.

National Pure Soluble Blue A surpasses in solubility, freedom from sediment and suspended matter all other soluble and cotton blues of domestic or foreign manufacture. National Pure Soluble Blue B is similar to this but somewhat weaker, duller and redder in shade.

National Cloth Red 2R, in shade and general properties, resembles the pre-war Wool Red B and Fast Bordeaux O. It is of special interest because of its good solubility and brightness of shade.

On wool National Cloth Red 2R produces shades of excellent fastness to water and perspiration, and good fastness to sunlight, crocking and fulling. It is applicable as an acid dye and by the different chrome methods, which makes it especially desirable for shading purposes in conjunction with chrome colors. Due to its neutral dyeing properties it is suitable for the dyeing of union material. Wool is dyed a full shade; silk and cotton are left much lighter. It possesses good affinity for silk when dyed in boiled-off soap bath broken with formic acid.

The company will be pleased to supply samples and full technical information upon request to any of its branches.

### **INDIANS BOYCOTT ENGLISH COTTONS**

That the boycott on English cotton goods in India is complete, and the British textile manufacturers are now turning their attention toward developing trade with China, was the statement of H. E. Beney, of London, who arrived in Vancouver on the Canadian Pacific Steamship Company's liner "Empress of Asia" after an extended tour to the Orient. While the natives of India are not disloyal, and were most keen to pay their respect to the Prince of Wales on his recent visit there, they are absolutely under the rule of their leaders, many of whom are paid by German interests, stated Mr. Beney. No British cotton goods have been bought by them for some time past, as the natives are

now weaving their own material by hand and by looms imported from Germany, and it is feared that the Lancashire mills have lost their trade for a considerable time at any rate.

The enormous field in China hitherto undeveloped, however, will more than repay the British manufacturers for their loss of trade with India, and they are now exerting every effort to increase their business. Mr. Beney suggests that Canadian manufacturers would do well to pay more attention to this field.

### **CAMPBELL OFFERS AMIDINE DIAZO BLACK BHO, AMIDINE FAST ORANGE Y AND ACEKO MILLING BLUE R**

Recent circulars and bulletins of John Campbell & Co., 75 Hudson Street, New York City, describe products of this concern being marketed under the designations Amidine Diazo Black BHO, Amidine Fast Orange Y and Aceko Milling Blue R.

The first of these, or similar products, has been used by colorists and mill men under various designations, such as Diazo Black BHN, Diamine Black BH, Oxamine Black BH, Diazine Black H Extra, Naphthamine Black CE and Direct Navy Blue, various marks.

Amidine Diazo Black BHO dyed with common salt or Glauber salt produces an intense navy blue on cotton, of good fastness to washing. It dyes very level, and in the dyeing of mixed fibers composed of cotton and wool, or cotton, wool and silk, it scarcely stains the animal fiber when properly applied. It is also one of the most commonly used cotton colors for solid union blues in conjunction with Aceko Cyanine or Pershing Purple. It is a serviceable color for artificial silk, and is likewise an excellent product for speck-dyeing "burls" in worsted or woollen piece goods. As a saddening color for browns and tans and cordovans on hosiery fibers, cotton yarn and cotton raw stock, it is highly recommended by its makers.

Amidine Diazo Black BHO is also used for navy blues for silk piece goods which have to stand washing, this being accomplished by developing with betanaphthol or betanaphthol mixed with resorcline. Discharge printers find it useful for obtaining clear whites in conjunction with "Camelite," another product of the company described elsewhere in this issue, and dyers generally who wish samples for experimental testing may obtain them on application to the company, which also stands ready to submit practical results on any fiber of which a sample may be furnished.

Amidine Fast Orange Y is a valuable product supplementing the company's cotton color series. It is serviceable for straight cotton dyeing or yarn or pieces, and likewise for artificial silk. It possesses great covering power which, when combined with its good properties of fastness to light, acetic acid, alkali and washing, makes it attractive in quality and value. It is recommended by its makers for fabrics composed of cotton and silk, as the latter fiber remains unstained



when properly applied. It discharges in light shades only. Desirable khaki shades are produced after using this product as a grounding color together with Amidine Fast Yellow 4G and Amidine Blue BHO. While the fastness of Amidine Fast Orange is generally satisfactory, the company recommends that its customers make their own "tests for fastness."

Aceko Milling Blue R is a new Acid Blue dyestuff which has been brought out for woolen and worsted dyers, and for hosiery manufacturers and silk skein dyers. It produces bright, bloomy shades of fair fastness to light and good fastness to milling. It is recommended for dark colored or stripped shoddies and silk noils that are intended for yarns in which fastness to washing is the main requisite. It is fast to the action of chrome and is used as a brightening agent for Chrome and Alizarine colors. This product is likewise a valuable type for unions, as it dyes well in a Glauber salt bath. Tests for fastness should be made for the particular purpose for which the color is intended to serve.

### BURLAP LEADS ALL U. S. IMPORTS OF TEXTILES

A recent report of the United States Tariff Commission on jute cloth may be briefly summarized as follows:

Imports of burlap, which is used chiefly for bags and wrappers, as a backing for linoleum, and as paddings in coats, are far greater in value than imports of any other textile. Ordinarily, the value of foreign burlaps consumed yearly in the United States is about equal to the combined value of all the wool manufactures imported under schedule K, and of all the countable cotton cloth. In 1920 about 1,065,000,000 yards of burlap valued at \$88,896,000 were imported. Total imports of wool manufactures in the same year were valued at \$50,453,000 and of countable cotton cloth at \$44,913,000.

The only type of jute cloth produced in the United States is the heavy coarse wrapping, known as cotton bagging, used for covering raw cotton. About 90,000,000 yards of bagging are required annually to cover the American cotton crop. Practically all of the new cotton bagging consumed in this country is supplied by two American companies, which are the world's leading manufacturers of this article. Because of the strong organization of these companies, and their long prominence in the field, the volume of imports is small.

The United States, however, is about to lose its bagging industry. The two domestic companies are now erecting bagging mills in India, and have shipped abroad part of the bagging machinery formerly operated in this country.

The United States is the world's greatest consumer of burlap, importing about 260,000 tons of fabric yearly. Notwithstanding the tremendous demand, which has more than trebled in the last twenty years, the domestic production of burlap has been insignificant. The record American output was during the war when 7,292,000

yards were produced—less than 1 per cent of the domestic consumption. This production was brought about through an artificial price level which caused burlap to sell at about 25 cents per yard as compared with the pre-war price of about 5 cents.

The United States now receives about 93 per cent of its supply of burlap from Calcutta, India. Calcutta produces about one-half of the world's consumption of jute fabrics and bags, which in recent years have been India's leading export. In 1921, exports of Indian burlap and jute bags amounted to 829,000 tons valued at \$171,291,000. Such shipments made up 22 per cent of the value of all Indian merchandise shipped overseas in 1921, and about 60 per cent of exports of articles wholly or mainly manufactured.

Calcutta owes her dominant position to her ability to manufacture burlap at a price so low that no country can compete except by means of a very high tariff. The average price per yard of burlap shipped from Calcutta to the United States before the war was about 2.75 cents and in 1920 about 4 cents. The production of raw jute is confined to India; the crop averages yearly about 8,000,000 bales of 400 pounds each. This monopoly of the raw material, close proximity of centers of production to centers of manufacture, and low labor costs are India's leading advantages. A comparison of wages paid in American bagging mills with those in Indian jute mills, shows for instance that in January, 1921, a weaver in an American mill received \$19.50 per week, as against \$2.84 paid to the weaver in an Indian mill. Indian labor is, however, relatively inefficient, but the employment of Scotch overseers and the use of up-to-date machinery minimize somewhat this handicap. A number of mills generate their own electric power. As a result the jute industry is maintained at a level of efficiency that is high for India.

Information is also given as to the uses of the various types of jute cloth, the scope of the domestic trade in each type, and the condition under which a domestic burlap industry could be fostered. Charts show the prices of Calcutta burlap since 1890, the rapid growth of the Indian industry in the same time, and how it has forged ahead while the jute manufacturing industries in other countries have been barely able to hold their own.

Copies of this publication may be procured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents per copy.

Hine Brothers, dealers in aniline colors and agents of the Cooks Falls Dye Works, moved on May 1 from 80 Maiden Lane, New York, to 5 Cedar Street. The members of the firm are William and Arthur Hine.

Springdale Finishing Company, Canton, Mass., has been incorporated with capital of \$1,000,000 by George E. Sinkinson, president; Harry A. King, treasurer; Charles H. Gelpke, clerk; Frederick Apintig, Jr., director.

## ORGANIZE TO GIVE SCIENTIFIC SERVICE TO MANUFACTURERS

Organizations of business men are wont to establish a variety of services designed to the profit of the members of the group—legal, taxation, insurance, accounting, banking and freight are subjects usually receiving special consideration, says the "Journal of Industrial and Engineering Chemistry." But it has remained for the Associated Industries of Massachusetts to establish a technical information service for its members. This is a forward step of direct interest to chemists and establishes a precedent which should assist chemists in other localities in bringing home to manufacturers a realization that in applied science they have a reliable anchor to windward.

New England has been a favorite place for such activities, because of its relatively small area, the concentration of its diversified manufacturing, and the agencies at work. The several colleges and universities and technical schools have been active centers, aided by several commercial laboratories. When one chemist does a really good piece of work, all chemists and the science are directly benefited. If the work is poor, all suffer. We quote from the Association's announcement:

"The service is equipped to answer inquiries on the fundamental processes employed in manufacturing operations, such as steam generation, water softening, lubrication, heating, drying of materials, filtration, distillation, evaporation, dyeing, etc., and to supply members with knowledge which will be of material aid in solving problems of construction, the properties of building materials, the selection of the more important types of equipment for certain operations, the erection of machinery, and the like. It is also in a position to direct members to sources of information on technical subjects and to places where materials or equipment can be obtained to the best advantage."

This is an encouraging sign which should be brought to the attention of business organizations everywhere.

## JOHN CAMPBELL & CO. ANNOUNCE "CAMELITE" FOR STRIPPING COTTON, WOOL AND SILK

John Campbell & Co., 75 Hudson Street, New York City, announce having added to their manufacturing program a very important auxiliary to dyestuffs, which they market under the name of "Camelite."

This is a stripping preparation for cotton, wool and silk, which has heretofore been sold under many designations such as Hyraldite Z, Decroline, and others. Camelite, according to the announcement, offers the best means for stripping dyed fabrics. It is an indispensable product for every dyer, particularly shoddy, worsted and woollen dyers, cotton dyers, and garment dyers. It is positive in its action and offers many advantages over other methods of stripping; for instance, Chrome and

Sulphuric or Oxalic Acid, as the fibers are left in much better condition.

Most all of the coal-tar range of dyestuffs are stripped to light grounds with Camelite. The standard method of stripping is as follows but this may be modified to suit the user's most particular needs:

In a lukewarm bath at a temperature of 105 to 120 deg. Fahr.

Add 2 to 4 per cent Camelite (Dry Form) and

2 to 5 per cent of Formic Acid 85 per cent, or, if preferred,

1 to 2 per cent Sulphuric Acid 168 Tw.

Enter the goods, raise in about one-half hour to boil.

Boil for 20 to 30 minutes, then rinse in a cold to lukewarm bath very thoroughly, after which the goods are ready for redyeing.

Camelite, it is stated, is not to be confused with the ordinary forms of Hydrosulphite of Soda, as Camelite is prepared for the one purpose, viz. stripping of dyed materials. This product is shipped in a powder form in airtight containers.

The company offers the services of its Coloristic Laboratory in assisting dyers to obtain their shades, and announces that if consumers have any material on hand which is not in a salable condition, it will, providing a sufficient sample of the yarn or fabric is sent, strip the material and redye it to a marketable shade.

## PLAN "MAKE IT OF RIBBON" CONTEST TO STIMULATE DEMAND

A nation-wide "Make It of Ribbon" contest is planned by the ribbon manufacturers of the United States in order to increase the consumption by stimulating the demand for ribbons. Meetings, to which all ribbon manufacturers were invited, have been held in the rooms of The Silk Association of America and a definite promotive campaign is about to be announced.

An intensive publicity campaign through media of proved effectiveness is under consideration and a country-wide contest carrying a series of prizes for the best idea worked out in the various widths of ribbons.

Announcement of the plan will be made to the whole ribbon-handling fraternity—manufacturers, salesmen, jobbers, specialty houses, retailers, buyers and heads of stock—within the next few weeks in order that the fall season may benefit from the effects of the campaign.

The ribbon industry represents an investment of approximately \$20,000,000 in machinery and loomage capable of turning out approximately \$60,000,000 in merchandise. In the opinion of the manufacturers, this investment is at the present time at the mercy of chance, because it is not safeguarded by any co-operative policy of merchandising. The product is also at the mercy of chance because it is crowded upon a market which may or may not be ready to absorb it.



As one manufacturer has stated, "The ribbon manufacturers plant twice a year, but never plow their field."

The temporary committee on plan and procedure which has been appointed to formulate plans is headed by Ernest C. Wettlaufer, of Wettlaufer Bros. Other members are: B. P. Bartlett, John C. Welwood Corporation; Benjamin Jacoby, Best & Jacoby; Andrew Kane, Taylor-Friedsam Company; Henry Zuber, Pelgram & Meyer; John B. Taylor, ex-officio, Phoenix Silk Manufacturing Company.

#### NEW COLOR OFFERINGS OF GRASELLI CO.

The Grasselli Chemical Company is now offering a new wool color under the name of Cloth Red B Concentrated, which is chemically identical with the well-known formerly imported Cloth Reds manufactured by the Farbenfabriken of Elberfeld Company. The fastness to light and the fastness to fulling against white wool is very good. Cotton and silk are slightly tinted by a severe milling. The new product may be dyed on wool according to the acid, chrome mordant, afterchrome or monochrome processes. It is also useful in the dyeing of silk, as full rich shades of red are obtained.

The Grasselli Company has also placed on the market a new product under the name of Direct Rubine B, which is a direct dyeing cotton color similar in shade to the formerly imported Benzo Rubine H W. The new color gives a bright bordeaux shade on cotton. It should also prove of great interest as a union color, as it dyes cotton and wool the same shade.

#### READING TEXTILE MANUFACTURERS HELP COLLEGE FUND

Textile manufacturers of Reading, Pa., have contributed liberally to a fund of \$350,000 to convert Schuylkill Seminary, North Reading, into a college with a permanent endowment. Of the amount needed, \$240,000 has already been covered. George D. Horst, head of the Nolde & Horst Company, one of the trustees of the college, headed the list with a gift of \$50,000. The Wyomissing Industries gave \$25,000. Charles L. Leippe, of Reading Knitting Mills; E. Richard Meinig, of E. Richard Meinig Company, and S. D. Bausher, of Glorie Underwear Mill and Acorn Hosiery Mills, gave \$5,000 each. Mr. Bausher, president of the National Association of Hosiery and Underwear Manufacturers, is serving as treasurer of the fund.

British patent No. 171,078, assigned to the Farberwerke vorm. Meister, Lucius & Bruening, is concerned with a method of making stable vat dye preparations by mixing alkali indigo white with alkali leuco compounds of quinone vat dyestuffs such as sulphurized arylido-halogen quinones, and evaporating the same to dryness in a vacuum. Materials such as molasses, or sulphite cellulose pitch may also be added.

#### NEW VIRGINIA-CAROLINA BOND ISSUES

Issues of \$35,000,000 in bonds of the Virginia-Carolina Chemical Company have been underwritten by Wall Street bankers. One of the new issues is \$22,500,000 first mortgage twenty-five year 7 per cent sinking fund gold bonds, due June 1, 1947, which will be offered at 98¾, to yield about 7.12 per cent. The other issue is of \$12,500,000 fifteen year 7½ per cent convertible sinking fund gold bonds. The syndicate includes Blair & Co., Inc.; Hallgarten & Co., the Equitable Trust Company and the Chase Securities Corporation.

The new financing will provide for the purchase or retirement at or before maturity of all the company's existing funded obligations and will supply additional working capital. The total authorized amount of the first mortgage bonds is \$35,000,000, of which it is proposed to issue at present \$22,500,000. They are to be secured by a first mortgage on all the company's physical properties and will be further secured by the deposit of the entire \$10,000,000 capital stock of the Southern Cotton Oil Company, and the stock of other subsidiaries.

George H. Perkins, consulting textile engineer and secretary of the Textile Division of the A. S. M. E., moved his offices on May 15 from 34 Batterymarch Street, Boston, to the Mason Building, 70 Kilby Street, Boston.

#### WANTED, COLORIST

Wanted by large manufacturer of dyestuffs, colorist who has had scientific training in dyestuff chemistry. Applicant should be familiar with the practical application of all kinds of dyestuffs and must be able to conduct all work necessary for the investigation of new colors. Address Box 211, American Dyestuff Reporter.

#### WANTED, LABORATORY MAN

Wanted by large dyestuff manufacturing concern, reliable man to take charge of routine work in dye laboratory. Applicant must be familiar with the dyeing and testing of all classes of dyestuffs, including vat colors. Man who has had practical dyeing experience is preferred. Address Box 212, American Dyestuff Reporter.

Large manufacturer has good opportunity for dyestuff salesman who is well acquainted with woolen and worsted mills in Rhode Island and Connecticut. Reply to Box 213, American Dyestuff Reporter.

TEXTILES

PAPER

LEATHER

# AMERICAN DYESTUFF REPORTER

Including the Proceedings of the  
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME X

JUNE 19, 1922

NUMBER 13

## FEATURES OF THIS ISSUE

"Suggested Method for Filing Sample Dyeings," by E. W. Adams, tells how one mill worked out a convenient system for ready comparisons.

Color chemists should find extremely useful a "Cross-Index of Green-Schultz and Schultz-Green Numbers" prepared for use in the Color Laboratory, U. S. Bureau of Chemistry.

Proceedings of the A. A. T. C. C. include the Research Committee's provisional method on fastness to washing, soaping, laundering and fulling of dyed and printed cotton against white cotton.

Three alumni papers from the Philadelphia Textile School are: "Dyeing Wool as Raw Stock," "Warp Yarn Mercerizing," and "The Padder in the Dyeing of Cotton Piece Goods."

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PAINTS

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# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

VOLUME X

NEW YORK, JUNE 19, 1922

NUMBER 13

## Suggested Method for Filing Sample Dyeings

Present Systems of Dye Manufacturers Lack Uniformity and Do Not Permit Easy Comparisons of Various Type Brands—How One Laboratory Overcame This, and an Invitation to Dyestuff Firms to Co-operate

By E. W. ADAMS

*Chemist, Lewiston Bleaching & Dye Works, Lewiston, Me.*

EVERY textile chemist who has anything to do with dyestuffs receives, from time to time, announcements, folders, color cards and similar advertising material from manufacturers of dyestuffs. Books and pamphlets may be filed in bookcases; circulars may be filed—but much of the material cannot be made to fit into permanent records and thus become a help both to the chemist or dyer and dyestuff manufacturer.


The German manufacturers, through their comprehensive encyclopedias of dyeing and pocket manuals, did much to help the mills. Several of our larger American manufacturers of dyestuffs are placing loose leaf binders, containing valuable information regarding their products, among the mills, and mill men appreciate the efforts which these manufacturers are making to give detailed and accurate information.

### LIMITATIONS OF PRESENT SYSTEMS

The one criticism here offered is that books or loose leaf folders do not permit a comparison of the dyeing of one dyestuff with another similar color. During the past four years we have worked out a card system for filing dyeings of colors submitted to us. The cards are filed under classes of dyestuffs, and under colors they are filed alphabetically by the name of the dyestuff. While we are primarily interested in dyestuffs for cotton piece goods, this system can easily be modified to meet the needs of other branches of the textile industry.

Under "Class" we list basic, developed, direct, sulphur, vat, special. This could easily be expanded to meet the needs of the wool and silk industry.

Under "Number" we formerly gave every sample of dyestuff received a number. Samples from Bayer were: "By. 1, 2, 3." etc.; from Cassella: "C. 1, 2, 3,"

CLASS	LABORATORY	NUMBER
Direct	Lewiston Bleachery & Dye Works	
NAME	Erie Fast Scarlet 4BS	PRICE 2.50
MAKER	National	DATE 2-10-22
2% DYE		
		
ANI 00		

### DYEING METHOD: - Regular

SOLUBILITY: Very Good

FASTNESS

LIGHT 3 Fair (little change in 7 days goes badly in 30 days)

WEATHER Fair

WASHING Good in light shades (Stains in heavy ")

ALKALIE 2 - slightly redder

ACID 1 No change (weak mineral acetic)

CROCKING 2-3 In heavy shades

GENERAL REMARKS Similar (Bayer's Benzol Fast Scarlet 4BS DuPont's Resamine " " 4BS)

HOT PRESSING 2, Yellowed, returns on cooling

PERSPIRATION 1 - Good

CHEMICKING 3 - Bleached

LEVEL DYEING Very Good

The above specimen card, together with that on the following page, show how this system meets the requirements of two classes of cotton colors

etc., and other firms similarly. With the advent of so many small American manufacturers and jobbers we have temporarily discarded that method of filing samples of dyestuffs, and now file the samples by colors, alphabetically. Eventually we shall go back to the old method. By this method the dyestuff wanted can be found instantly.




## HOW TO OBTAIN SATISFACTORY COMPARISONS

## A SUGGESTION

The space for pasting the sample on the card was made purposely at the bottom in order that similar dyeings might be compared by simply superimposing one card upon another.

For (a)—sulphur and also (b)—developed colors, we divide the space in two, so that (a) we may have a swatch of the sulphur color after-treated and (b) that we may have a swatch of the color developed.

We would suggest the consideration by the manufacturers of dyestuffs of a plan to use a card system for sending out information concerning their offerings. We have used our system merely as an illustration of a possible method. A larger card could be used advantageously. Such a card could show dyeings on the several fibers. In any case, however, the swatches should be so arranged that they may be compared with

CLASS <b>Vat</b>	LABORATORY <b>Lewiston Bleachery &amp; Dye Works</b>		NUMBER
NAME <b>Ponsol Yellow G - Dble Paste</b>		PRICE <b>5.22</b>	
MAKER <b>DuPont</b>		DATE <b>1-2-'22</b>	
10 lbs to 50 gal. of DYE			
			
AM 60			

DYEING METHOD:- <b>Special Padding Process</b>	
SOLUBILITY <b>Good</b>	
FASTNESS	
LIGHT <b>Good - Goes grey on long exposure</b>	HOT PRESSING <b>Excellent</b>
WEATHER <b>Good</b>	PERSPARATION <b>Excellent</b>
WASHING <b>Excellent</b>	CHEMISING <b>Excellent</b>
ALKALIE <b>Excellent</b>	LOWEL DYEING <b>Excellent</b>
ACID <b>Excellent</b>	Hydrosulphite - <b>Blue</b>
CROCKING <b>Excellent</b>	
GENERAL REMARKS <b>Similar { Indanthrene Yellow G, Newport Anthrene Yellow G</b>	

*The above illustration, showing front and back of a specimen card, may be compared with that on the preceding page for an example of convenience of comparison*

Our dyeing methods are standardized and are similar to those which have been so well given by Scott,<sup>1</sup> Estey,<sup>2</sup> and Hayes.<sup>3</sup>

We test for fastness of the color by the methods outlined in Schultz's "Farbstofftabellen" (1914 Edition) and similarly in Hoechst's "Pocket Manual" (1911). Our sulphur khaki shades are subjected to the tests required by the Army Department in their purchases. There is no need to elaborate on them here, since these tests for fastness are probably available to most textile men.

## STANDARDIZED INFORMATION FROM DYE MANUFACTURERS

If I remember correctly, an editorial appeared in the AMERICAN DYESTUFF REPORTER during the Spring of 1920 which suggested a standardized system for the supplying of information by the manufacturers of dyestuffs to the mills.\*

Such a plan should appeal to dyestuff manufacturers. The Congressional Library supplies cards to other libraries, and this is a valuable service. Could our new American Association of Textile Chemists and Colorists maintain a bureau or clearing house to put out information concerning dyestuffs, or could our manufacturers of dyestuffs use the same methods of dyeing and tabulating the properties of their colors, a valuable service would be rendered to the mills.

\*Mr. Adams evidently refers to "What of the Future?" by Louis A. Olney, this Journal, September 13, 1920, p. 11.—Ed.

swatches of a similar dye on another card.

The present method of sending out all sizes, shapes, and varieties of pamphlets and announcements does not give a maximum of usefulness to either the mills or dyestuff manufacturers.

## ADVANTAGES OF STANDARDIZATION

A system as partially outlined would bring information to the textile chemist or dyer in a thoroughly practical way:

(a) A card system is the simplest and easiest way of filing any information.

(b) The system easily expands to take in new colors as they are placed upon the market. Books of dyeings and pamphlets do not; the collection of pamphlets accumulates.

(c) Essential information about and properties of each color are available in condensed form.

(d) Similar colors from different manufacturers can be easily compared by placing one dyeing upon the dyeing on another card.

(e) Similar systems of filing dyeings are in operation in other mills.

<sup>1</sup> Dr. Walter M. Scott, American Dyestuff Reporter, Vol. 7, No. 15; October 11, 1920

<sup>2</sup> P. F. Estey, American Dyestuff Reporter, Vol. 8, No. 1; January 3, 1921

<sup>3</sup> Louis Hayes, "Color Trade Journal," Vol. X, No. 2; February, 1922

# Dyeing Wool as Raw Stock

By RALPH J. BATTYE

A Paper Presented at the Twenty-first Annual Meeting of the Alumni Association of the Philadelphia Textile School

(All rights reserved.)

**R**AW stock dyeing is utilized extensively to-day because of the popularity of the so-called mixes and blends. It has always held its place in the making of this character of yarn and is an essential process linked in with wool yarn manufacture. The manufacture of worsted blends will not be considered in this paper, although this processing is similar in many respects to the blending of raw stock except it is done in the top.

Production and quality of work in the handling of raw stock depends to a large extent on the skill of the individual dyer. The first and most important consideration is to work with clean wool, that is, with wool thoroughly scoured and washed free from all impurities. Dirty or greasy wool will lead to uneven dyeing. Also, if the wool fibers are to be preserved in their natural condition with as many of the original properties as possible intact, it can be seen that correct methods of handling must be employed.

The wool is delivered to the dyer in batches or "sheets." If the scouring is done at the same plant it may be delivered wet, in which case it is important that the amount of moisture present be known.

The oldest style of dyeing apparatus for raw stock wool dyeing is the open tub or kettle. This is still in practical use and is generally conceded to give the best results even to the present day when compared with the machines attempting to replace it.

These tubs are almost always circular wooden kettles held together with iron bands around the circumference. The kettle has a false, perforated bottom. This false bottom is practically a wooden floor in which holes are bored, or consists of perforated iron segments resting on two steam pipes set at right angles to each other but drawing steam from the same line. The steam pipes are on the bottom of the kettle and under the false bottom. These steam pipes are made as a cross and along their length are perforated to allow the steam to escape in the bath in a horizontal or downward manner. This last point is important as it promotes even dyeing because the liquor in the tub is heated in a more uniform manner and the steam prevented from directly striking the stock. The false bottom also prevents the raw stock clogging the steam pipe and there is no loss of stock when draining the kettle.

The plug for draining is in the bottom of the kettle and beneath the false bottom. Connected to the plug is a long iron rod which extends to the top of the kettle.

This acts as a handle, is usually encased in wood, and prevents the stock from running through the outlet during the draining of the kettle.

The kettles or tubs are usually set partially below the floor level, according to the depth of the kettle, the height above the floor being such as to make the working of the stock convenient to the men. Two or three men are required to work the wool. On a two hundred pound kettle, two men are used. The stock is worked with wooden poles about twelve feet in length and of about six inches in diameter at the center, tapering down to three or four inches at the end. The process of working the stock is called "poling" and is carried out as follows: If two men are working they keep directly opposite one another on the opposite sides of the kettle. Each man puts his pole down along the side of the kettle to the false bottom and then, sliding them on the bottom, the poles are brought up at the center, touching one another. When the poles are thus raised clear of the dye liquor, the stock is shaken off or rolled over by rolling the pole. In this way the material is moved through the liquor and even shades obtained. The men poling the stock keep following one another completely round the kettle.

Tubs vary in size but are seldom built to hold more than five hundred pounds of stock. The average size kettle is made for dyeing about two hundred pounds of material. It would be made of three inch wood, would be six feet in diameter and four feet deep, inside dimensions. The false bottom would be about six inches from the bottom. The water supply is derived from a line piped to the top of the kettle.

For the dyeing of this class of material, colors of maximum fastness to light, washing, etc., are required. It is therefore necessary to use chrome colors applied by one of the following methods, depending on the character of the dyestuffs employed:

1. Chrome mordant or bottom chrome method.
2. Chromate method.
3. After-chrome or top chrome method.

In the bottom chrome method, the first operation is the chroming. Some colors are only applicable by this method of first chroming the material, carried out by adding the requisite amount of water to the kettle, usually to within about one foot of the top of kettle, this allowing room for the stock and for condensation of steam as kettle is heated. To this water is added, based on the



weight of material, 3 per cent of potassium or sodium dichromate (commonly called chrome) and 3 per cent of lactic acid or cream of tartar as an assistant. Lactic acid is usually used for dark shades while cream of tartar would find use for mordanting for light shades. The kettle is raised to the boil, the stock entered, worked for a short time and then allowed to remain in the boiling bath for one hour. The liquor is then run out and the wool washed well in preparation for its subsequent dye bath. In this process the wool has been mordanted with a hydroxide or hydrated oxide of chromium which gives the material an affinity for the dye which it originally did not possess.

Colored shoddies are partially stripped in a very similar manner to the above chroming process. The treatment in this case is more severe, 4 per cent sulphuric acid and 7 per cent of sodium dichromate being used, liberating the strong oxidizing agent, chromic acid, which does the stripping by destroying or partially destroying the color on the shoddy. This treatment permits the dyeing of dark shades with this class of material, whereas if stripping was not resorted to, blacks only could be dyed. Aside from stripping, the treatment simultaneously acts as a chroming bath and the shoddy is subsequently dyed on the chrome mordant deposited in the material.

#### DYEING ON THE CHROME BOTTOM

Water to the depth of eighteen inches is run into the kettle and the dyestuff added. The bath is then boiled until the dye is thoroughly dissolved. Cold water is then run in to within one foot of the top of the kettle which reduces temperature to 110-112 deg. Fahr. If acetic acid is to be used in the dyeing it is now added. The wool is thrown in and pushed down in the liquor with long handled forks. It is kept in motion by the poling described above and after working five minutes, the steam is turned on and the temperature slowly raised to the boil. The liquor should not be brought too quickly to the boil, if even shades are to result. While raw stock does not have to be perfectly even, it must possess a degree of regularity. When the boil is reached, the steam is shut off for five minutes and then turned on again and wool boiled one and one-half hours. A sample is then taken, carded and compared with the shade desired.

Logwood is a typical dye applied by the chrome bottom process. The wool is chromed, washed and entered into a bath of about 330 per cent of Hematine paste along with violet, brown or other toning colors for shading the black. A small percentage, about 1 per cent, of Ammonia water could be added to keep down acidity of bath. The Logwood dye bath is started at the boil and boiled two hours, the kettle drained and the wool "smothered" for twelve hours. Logwood is a level working dye and thus can be started at the boil and still produce even dyeings.

When using the chromate method, the bath is made up

in a similar manner as explained in the dyeing on a chrome mordant. In this method the material is not mordanted first but the sodium or potassium dichromate is added directly to the dye bath with addition of ammonia and acetic acid so that the dyeing and fixing of the color takes place at the same time. Samples are taken after one and one-half hour boiling.

For chrome top method, the dyeing takes place in a similar manner but the additions of ammonia and chrome to the dye bath is omitted. As assistants to the dyeing, 20 per cent Glauber's salt and 1 per cent sulphuric acid or its equivalent of acetic acid is added. The dyeing starts at low temperatures, raised to the boil and after boiling one hour the bath is allowed to cool to 160 deg. Fahr. Chrome is then added in an amount of about one-half the quantity of dye used, the bath again raised to the boil and boiled about one hour. This treatment with chrome develops and fixes the color.

Additions can be made directly to the dye baths if either the chrome bottom or chromate methods are employed, but in the case of the chrome top method, a fresh bath must be made up. The wool is usually boiled one-half hour after an addition of dye is made but the time would vary with the conditions.

After the material has been passed as to shade, the plug is lifted, allowing the liquor to drain out. The stock is then washed by allowing cold water to flow in the tub and then draining again. It is then thrown out of the tub into a box cart by hand or with forks, carried to the extractor and then to the dryer of the usual continuous type. After drying, the stock is ready for the pickers and cards.

Dyed stock is the hardest problem of the carder in producing yarn. Care must be taken in scouring and dyeing raw stock as lack of softness in the finished fabric could be traced to faulty processing in these preliminary processes. It must be kept in mind that there is a possibility of spoiling the finished fabric before the yarn is made. Raw stock if subjected to an unusually hard boil will mat together or felt. Felting is the usual fault, making it almost impossible to card the material without breaking the fibers and rubbing the stock into little pills which appear in specks of color in the finished yarn, whereas the color should have been evenly blended. Another fault which is a close second to the felting, is "burning" the fiber, in which the elasticity has been largely reduced and where it is impossible to spin the wool into yarn within perhaps 30 per cent of its actual value.

Naturally, the above method for dyeing raw stock by hand is laborious and machine dyeing has been suggested and is being used to increase production and reduce labor costs. These machines are of various types and possess capacities as high as twelve hundred pounds in one dyeing.

Some are based on the principle of keeping stock stationary, being fitted with centrifugal pumps and supply tanks, the liquor being forced through the tightly packed

material. Others like the Hussong machine are provided with stationary wire cages divided into horizontal compartments into which the stock is loosely thrown and the liquor circulated through this loosely packed material with propellers situated at one end of the machine. Still another type is the Klauder-Weldon machine consisting of a half-round kettle into which is circulated a perforated, hollow cylinder revolving on its axis in the kettle which in turn holds the dye liquor. This perforated cylinder is divided into four or more compartments which

have swinging doors to admit the stock. The principle of this machine is the same as that of the open kettle, the stock being moved through the dye liquor. These machines can be had of rather large capacity.

While the machines save labor and increase production, they do not produce the evenness of shade and penetration that is obtainable in the open tub and are usually best adapted for the dyeing of the darker shades. The open tub therefore still holds its place of importance for the dyeing of wool as raw stock.

## Warp Yarn Mercerizing

A Paper Presented at the Twenty-first Annual Meeting of the Alumni Association of the Philadelphia Textile School

By LAWRENCE A. STEAD

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**W**HEN John Mercer took out his patent in 1850, for "Improvements in the Preparation of Cotton and Other Fabric and Fibrous Materials" with strong caustic soda solution, he laid the foundation for the mercerizing industry, but very little or no importance was attached to Mercer's discovery at the time, and in fact it had no commercial application until thirty years later, when a patent was taken out for crinkled effects upon cloth, which had a very limited field.

The one phase of the process which made the mercerizing industry possible, i. e., the application of tension, was not discovered until 1890, when H. A. Lowe applied for a patent describing a method for the production of luster, which is essentially the same as the present-day method. During the following fifteen years, the industry was of slow growth, due to the lack of proper machinery to produce mercerized yarns in quantity. This can be attributed largely to the secrecy with which the manufacturers held their process. In the years following 1905 the industry made remarkable progress by the improvements in the warp mercerizing machines. These machines have been highly perfected, producing seven to eight tons of mercerized yarn a day. The operation is a continuous one instead of being conducted in several stages as formerly.

As the construction of machinery to the preparation of mercerized yarns has been highly developed, the process may be considered more mechanical than chemical.

Mercerizing under tension has become the only application of the process in practice, and the term "Mercerizing" is to-day known as the production of luster by the application of tension to the cotton while subjecting it to the action of strong caustic soda solutions.

As the knitting trade is the largest consumer of mercerized yarn, the processing of warps for this use is here described.

The warps containing 378 ends, known as quiller

warps, and balled 6,000 yards in length, although at times they may be of greater or less length, depending on the size or count of yarn, are placed on a rack supported by a bar passing through the hole in the shell. The number of warps constituting a run on the machine depends almost entirely on the size of the yarn, the object being to control the load so that the same weight of yarn is passing through the machine. This tends to greater uniformity and permits of better control of chemicals. The warps after being set up are run in nearly as straight a line as is possible over brass rails, properly guided by pins to a binding machine.

The wraps now passing singly enter the binding machine at the bottom, passing beneath a wooden roller, which runs the full width of the binding apparatus. There are two such rollers running parallel to each other, the reason for which is to permit the warps to pass in a vertical manner through the tubes of the machine. The size of the machine will largely depend upon the local conditions, although it has been found when possible to have an increased number of tubes, and to reduce the number of warps passing through the individual tubes, which, of course, facilitates the subsequent splitting operation, e. g., it is far better, all things being equal, to run forty-eight warps through the binding machine having sixteen tubes, three warps to each tube, than it would be to run the same number of warps, six warps to a tube, through a binding machine having but eight tubes. The warps pass through these vertical brass tubes in sets, the number of which is determined by the size of the run. As the warps leave the tube they are bound by a cord in a spiral manner, the pitch of which is determined by the speed of the machine. It has been found that a pitch of 10 to 12 inches answers quite satisfactorily. The object of this spiral binding is to prevent any broken ends from falling away from the main body of the warps, which if allowed to do so, will cause serious damage to the yarn while passing through



the mercerizing machine, producing what in practice is known as roller laps. This condition is brought about by the free ends attaching themselves to the roller and accumulating as the warps pass through the machine. This becomes so aggravated at times as to cause the breaking of a number of warps and possibly tearing the roller away from its bearings.

The warps pass over rollers situated directly above the binding machine. Eight sets of warps pass over one roller, while the remaining eight pass over another. These rollers should be sufficiently high and located at such a distance apart from the entering end of the mercerizing machine, as to reduce the angle of the warps to a minimum. These machines are usually made up of 15-17 compartments, each compartment being a single unit in itself, but firmly fastened to each other. The object of these individual units is that they may be easily replaced at any time. The length of these units will vary according to the use for which they are designed.

The warps after leaving the binding apparatus pass into the boiling-out compartment, containing a solution of weak caustic soda and Turkey Red Oil, or an equivalent amount of a castor oil soap. The solution is brought to the boiling point and this temperature should be maintained as nearly as possible throughout the run. The cotton fiber in its natural state is water-repellent on account of the waxy matter it contains. It is obvious, therefore, that this preliminary boiling-out process be carried out, as it tends to remove extraneous matter, at the same time softening the waxy matters, thoroughly wetting out the yarn and making the cotton receptive for the caustic soda.

On the delivery end of this compartment and all subsequent compartments, are heavy rubber squeeze rolls, the object of which is to remove the excess liquor from the yarn previous to entering the succeeding compartments. The warps, after passing through the boiling-out liquor, should be delivered cold to the strong caustic liquor, otherwise the cotton becomes tendered through the formation of oxycellulose and the luster is somewhat impaired.

The third stage consists in the treatment of caustic soda of 50 deg. Tw., at a temperature not exceeding 60-70 deg. Fahr. In maintaining the proper strength of caustic soda in the mercerizing machines, it is essential to have a storage tank containing caustic liquor of about 70-80 deg. Tw., which flows by gravity to a large cistern, which is submerged in the floor. From here the liquor is pumped to the machines, and by means of overflows the liquor returns by gravity to the cistern to be again strengthened by the heavy liquor from the storage tank. Through this means of circulation the yarn to be mercerized is in constant contact with the liquor of the proper strength and temperature.

While the cotton is in contact with the caustic soda, chemical action effects a chemical transformation in the molecular structure of the fiber by the formation of a chemical compound between the cellulose and the alkaline

hydrate in the molecular ratio  $C_{12}H_{20}O_{10} : 2NaOH$ . A second change is also observed by the fibers swelling similar to the process of ripening.

The general assumption has been that in order to produce luster, shrinking and swelling of the fibers are necessary. Hubner and Pope observed that the natural twist of the fiber does not always run in the same direction, but is generally twisted in parts to the right and in parts to the left, a number of these changes in the direction of the twist being perceptible throughout the length of a single fiber. Considerable importance is attached to this change of twist in the production of luster during mercerization.

It is a known fact that 40 deg. Tw. is the lowest concentration of caustic soda at which effective mercerization for practical purposes can be carried out, and if this be true, it necessarily follows that the production of luster is connected with the action of caustic soda of definite concentrations.

Investigation of the subject has confirmed this view that untwisting of the fiber precedes the swelling up to a caustic concentration of 40 deg. Tw., while the reverse is the case at concentrations above 40 deg. Tw. As there are certain chemicals which cause intense swelling, but no untwisting of the fiber and consequently no luster, it can be stated that in order to obtain maximum luster the mercerizing agent must produce in a high degree swelling, untwisting and shrinking of the fibers.

The yarn is in contact with the mercerizing caustic about two minutes. This is sufficiently long enough to insure mercerization, as can be seen from the following experimental data of Edmund Knecht, showing the influence of time on the mercerizing action of caustic soda of 50 deg. Td.:

Time	Shrinkage	Dyestuff Taken Up
5 seconds.....	15.7%.....	3.24%
10 seconds.....	17.4%.....	3.62%
20 seconds.....	25.0%.....	3.80%
40 seconds.....	25.0%.....	3.89%
60 seconds.....	25.0%.....	3.91%
180 seconds.....	27.4%.....	4.10%

Within the limits of actual working (say 40 to 180 seconds) there is not very much difference in the degree of mercerization, at all events, as far as the dyeing capacity is concerned.

The next step in the process is the removal of the caustic soda from the yarn, which is done in four washing compartments following the soda treatment. The washing is conducted on the counter-current principle. The wash water is heated to 120 deg. Fahr., and flows in an opposite direction to the travel of the yarn. By this method the yarn is constantly coming in contact with water containing less amount of caustic soda. The wash water is controlled so that an 8 deg. Tw. caustic is constantly

(Continued on page 455.)

# Pongee Silk Troubles

Cleaning of Pongee Dresses—Bleaching of Pongees—Dyeing of Pongees—Recommended Colors

By JOSEPH LOEBL

**T**HERE is hardly any article among the textile fabrics which causes more headache to the cleaners and dyers than dresses made of Pongee or Tussah silk, and whatever operation has to be done, whether bleaching, cleaning or dyeing, is sure to be met with difficulty. I hope it will be of great interest to you to hear a little bit about this wild silk.

## CLEANING OF PONGEE DRESSES

The dry cleaning process does not give a very satisfactory result on this article. It is best not to use a hard brush, as the brush injures the fabric easily, but the best thing is to run it in the washer with a good benzine soap and after rinsing and drying to wash the goods with soap bark, or tetrapole solution, and to rinse it finally with acetic acid. Where no wet-cleaning is available, the spotter has to show his skill. Brushing with a spotting brush will be sure to leave spotting marks. Therefore it is a rule not to use the brush, the best being mostly the sponge.

It is to a great advantage, however, while spotting pongees, to ascertain in the first place what has caused the stain, and sometimes just steaming will remove certain stains such as water marks, etc. Little dark and black points often found on pongees are removed with diluted muriatic acid. Coffee, cocoa, sugar stains, etc., will yield to glycerine. The stains are tapped with glycerine and left for a while, so that the glycerine will soften the stains. The next operation is to rinse carefully with cold or lukewarm distilled water and sponge. If the stains are not completely removed, repeat the operation, or if you are a skilled spotter, use hydrogen peroxide or perborate solution very carefully. It is very hard to remove ink stains without leaving a mark. Use Solvent P-2 with a little ammonia.

Patience is necessary in removing stains from pongees. The spotting should not be forced on this material as on other goods, but the stain must be given plenty of time to soften and to dissolve. The use of permanganate and sulphurous acid is not advisable, as the permanganate will surely leave a bad spotting mark. Of course, it may often happen to the most skillful spotter that he cannot avoid a spotting mark, but it is his business to hide such marks again as much as he can. A good remedy for spotting marks on raw silk as undyed pongees, is to put a little sweet oil on a flannel rag, and to spread over with this rag, all the marks. Such marks on dyed pongees are best covered with the so-called dry dyes, but it would take me quite a while, as well as a lot of space,

to describe this operation in detail, so I will do that at some other opportunity.

## BLEACHING OF PONGEES

The cleaner will seldom find it necessary to bleach pongees, and a treatment with permanganate of potash and sulphurous acid after the wet-cleaning of white pongee will mostly give satisfactory results. A little bluing is the best rinse and with Methyl Violet or Formyl Blue will mostly accomplish the whiteness. But in case the dyer has to dye some delicate shade on pongee, it is quite necessary to have bleached material, or rather perfectly bleached material. The best results are obtained with the hydrogen peroxide bleach.

For this purpose the bleaching bath must be heated to at least 180 deg., or best to the boil. Then add five pounds hydrogen peroxide (10 or 12 volume) to each ten pounds of Tussah silk. The bleaching bath must be made alkaline, which is best done by adding one pound silicate of soda to each ten pounds of hydrogen peroxide. The goods are then left in this bleaching bath for several hours.

For all dyeing purposes, or when working with goods that have to be dyed, this bleach will not be sufficient, but the goods have to remain white (that is, will not be dyed after this operation). It is necessary to add a little bluing. The highest grade of pure whiteness of this article is obtained by treating the material of a blue dyestuff such as bluish tint. The bluish pongees are now bleached with hydrogen peroxide. This operation of treating the material with this solution of a blue dyestuff will not only leave the goods beautifully white after the process, but will save a great amount of hydrogen peroxide.

## DYEING OF PONGEES

The dyeing of pongees in colors is contrary to the black color; that is, it is not hard at all. The best results are always obtained by dyeing in two baths. That means to bottom with direct colors, and to top with acid colors, with the addition of formic acid.

For instance, for navy blue, bottom with Union Blue 1-2472, dye for about three-quarters of an hour, rinse, and top with Cyanole Extra, or Formyl Violet, or with Brilliant Milling Blue, and Formyl Blue. An addition of a little Puropol is always recommended.

Brown pongee, or rather brown on pongees, can be dyed very well with substantive colors; for instance, Union Brown A, shaded with Diamine Yellow M.

For green, Diamine Green C L, shaded with the above-



mentioned yellow, is suitable. For very bright shades, top under addition of formic acid. Acid with Acid Green Extra, eventually shaded with Acid Yellow A T, topping with acid colors is also very good; for example, Brilliant Green shaded with Thiaflavin T, but such baths should not be too strong, as this dyeing is mostly cracking, and careful rinsing is particularly necessary to the topping bath.

To obtain nice red shades, a bottoming with sale colors is absolutely necessary, or to an advantage. Diamine Scarlet 3B shaded with Diamine N. The tapping is in the formic acid bath with Brilliant Croceine 5B for light shades, with Bordeaux BL, Amaranth B or Rocelin for medium shades, and the same colors shaded with Formyl-Violet or Cyanine for darker reds.

All dyeings with substantive colors can be topped with basic colors, but there is first the danger of cracking and unevenness. The topping with acid colors in a formic acid bath gives the purest and clearest and most beautiful shades. Dyed with substantive colors, they have furthermore the property to take the acid colors without the addition of much acid. Only a small amount of ammonia will be necessary.

If the finishing is done damp, pongees should not be sized. To avoid stripes, which sometimes occur when pongees are pressed damp or wet, is the reason they should not be sized.—“Cleaners and Dyers Review.”

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## Chemical Fire Hazards

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### Protection for the Chemical Industry from the Standpoint of a Fire Insurance Underwriter

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By WILLIAM G. GRIER

*General Agent, North British and Mercantile Insurance Company, Ltd.*

Assumption of liability upon risks or properties involving the hazard of chemical operations used to be dreaded by fire insurance companies the world over, and the rule was to dodge religiously plants where the chemical hazard was developed to any extent, even at very high rates. This almost universal feeling that such plants were not profitable subjects upon which to risk company stockholders' money may be ascribed to several causes; first, the fear born of ignorance and that there was a hazard present more or less of an unknown quantity, the strange and mysterious names and terms used, the very great difficulty of obtaining any other than the most vague information as to the nature of the processes involved, and so on, were largely responsible for this attitude. Owing to the fact that the number of chemical risks in the United States was comparatively small and the hazards unusually severe, the chances of securing a sufficient volume of business of this character, even at the high rates, were so small that it became an underwriting policy to avoid them almost entirely. In a few cases

very small amounts were written, principally of the so-called “accommodation business,” to assist valued agents in caring for their clientele.

This state of affairs has happily changed for the better, until to-day there are many plants devoted exclusively to the manufacture of a large variety of chemical products, of excellent construction, with good public or private fire protection well divided up among numerous separate or cut-off buildings or sections, that constitute very acceptable risks. In order to obtain the most advantageous insurance conditions there are certain cardinal points that are to be observed. Buildings should be low, preferably one story; walls, brick or hollow tile, of moderate area and well separate so as not to seriously expose each other. The roofs should be of light construction, especially where there are explosion possibilities, and floors of concrete. Particular care should be taken that the hazardous portions of the plant do not expose the power house and steam plant, the destruction of which would cripple the entire operation of the works.

In this connection one of the most important precautions to be observed is to see to it that ample space is provided for the packing and storage of valuable raw materials and finished products where they will not be endangered by a fire in the more hazardous part of the plant. Neglect of this precaution has caused some of the most serious losses in the writer's experience. Ample external and internal fire protection should be provided by installation of public or private hydrants, with hose equipment; and if the water supply from public mains is insufficient, supply should be furnished by means of pumps of approved type.

Outside of the common hazards of all manufacturing plants, such as lighting, heating, general cleanliness and upkeep, those most feared may be described as follows, commencing with the manufacturing processes. I will refer only to those that seem to stand out more prominently as constituting frequent causes of fire:

*Drying*, of either raw material or finished product, is frequently carried on in wooden closets heated by steam. This is always dangerous, even with low-pressure steam. Dry closets or boxes should always be constructed of non-combustible materials with metal trays where this sort of drying is carried on. As a matter of fact, when there are so many excellent forms of drying apparatus of high efficiency on the market, it has always been a matter of surprise to the writer that the primitive wooden dry closets is still so much in evidence, even when materials known to be subject to spontaneous ignition or products that have been washed or extracted with organic solvents of a highly combustible nature are handled. The types of fans or exhausts used in such places are sometimes a cause of fire or explosion where there are inflammable fumes or dust present.

(Continued on page 467.)

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

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Lowell Textile School, Lowell, Mass.

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## FORMATION OF PHILADELPHIA LOCAL SECTION

At the Council Meeting of the American Association of Textile Chemists and Colorists held in Boston on June 9, 1922, a petition was presented requesting permission to form a Local Section of the Association with headquarters in Philadelphia, to be known as the Philadelphia Local Section.

The petition, which read as follows, was duly signed by twenty-six Active Members of the Association:

TO THE COUNCIL OF THE AMERICAN ASSOCIATION OF  
TEXTILE CHEMISTS AND COLORISTS:

Gentlemen—The following members of the American Association of Textile Chemists and Colorists, desiring to organize a Local Section of the Association at Philadelphia, do hereby request your official approval as required by the Constitution of the Association:

Sidney S. Bailey, Jr.  
Elmer C. Bertolet  
R. A. Carter  
W. G. Hamlen, Jr.  
Charles S. Hollander  
L. N. Hood  
Russell W. Hunt  
Albert S. Jones

It was a great pleasure to the Council to approve the foregoing petition, and in accordance with Article XIII of the Constitution it proceeded with the election of a Secretary Pro-Tem, Prof. E. C. Bertolet of the Philadelphia Textile School being chosen in this capacity.

While this new section is to be known as the Philadelphia Local Section, the geographical boundaries of same will embrace the entire State of Pennsylvania, southern New Jersey, including that portion of the State south of a line just north of the city of Trenton and extending to the Atlantic Ocean in an easterly direction; the entire States of Delaware and Maryland.

There was some discussion as to the advisability of including Virginia and West Virginia, but the Council considered it better to adhere to the boundaries outlined above. It should be clearly understood, however, that members residing in the States of Virginia and West Virginia, as well as any other States in that locality, are eligible and are urged to affiliate themselves with the Philadelphia Local Section.

The Council is particularly pleased with the desire of the members in the vicinity of Philadelphia for the formation of this Local Section, and same should logically be one of the most active and progressive of the entire Association owing to its location in one of America's large textile centers and the great number of potential members in that vicinity.



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Proceedings of the American Association of Textile Chemists and Colorists

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**SEVENTH RESEARCH COMMITTEE  
MEETING**

The seventh meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held in the Engineers' Club, Boston, Mass., Friday afternoon, June 9, 1922.

The following members were in attendance:

L. A. Olney  
William K. Robbins  
William D. Livemore  
William H. Cady  
George A. Moran  
A. E. Hirst  
W. M. Scott  
Winthrop C. Durfee  
William R. Moorhouse  
W. J. Murray  
W. E. Hadley

The complete outline of the paper prepared on "Fastness to Washing, Soaping, Laundering, and Fulling of Dyed and Printed Cotton Against White Cotton" was thoroughly discussed by the Research Committee. The foregoing paper had been prepared under direction of George A. Moran, Chairman of the Special Committee appointed to consider the subject.

A number of slight changes were made in the character of the paper, and it was then considered to be complete enough to warrant its publication as a provisional method. Following the publication of this paper it is earnestly hoped by the members of the Research Committee that any criticisms that will be made and any additions or alterations needed to improve its character will be brought to the attention of the Research Committee.

It should be noted that Dr. A. F. Shupp, of the Mellon Institute, has been elected a member of the Special Committee investigating the "Fastness to Washing, Soaping, Laundering, and the Fulling of Dyed and Printed Cotton Against White Cotton." The work of Dr. Shupp at the Mellon Institute and his association with the work of the Laundryowners' National Association render his appointment particularly valuable to the Research Committee, and to the Association at large.

A special committee was appointed by the President to work throughout the summer considering the Fastness of Dyed and Printed Cotton, Wool and Silk to the Action of Light. The committee consists of the following members:

William H. Cady, Chairman  
George A. Moran

William K. Robbins  
R. E. Rose  
W. M. Scott  
W. J. Murray  
Hugh Christison

A special committee was appointed to work throughout the summer considering the Fastness of Dyed and Printed Materials to the Action of Bleaching. The committee consists of:

A. E. Hirst, Chairman  
O. R. Flynn  
W. E. Hadley

Both of the above committees are to report at the first Research Committee meeting held in September.

Respectfully submitted,

WALTER E. HADLEY, Secretary.

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**CHANGES OF ADDRESS**

The following changes and correction in names and addresses of members should be noted:

Fred L. Nuttall, 2504 West Silver Street,  
Philadelphia, Pa.

Joseph W. Russell, Palmer Mill, Three Rivers,  
Mass.

Edwin S. Millsbaugh, care of Atlantic Dye-  
stuff Company, Real Estate Trust Build-  
ing, Philadelphia, Pa.

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**NOTICE FROM THE SECRETARY****Applications for Membership in the American Association of Textile Chemists and Colorists**

All individuals who believe that they are eligible for membership in the Association and are desirous of affiliating with the organization can communicate with the Secretary, who will gladly furnish application blanks and extend to them every possible assistance.

It is desirable that members of the Association should make an effort to interest all those who they believe would make desirable members.

The Secretary will at all times be pleased to provide members with as many application blanks as may be desired.

WALTER E. HADLEY, Secretary.  
5 Mountain Avenue, Maplewood, N. J.

## Provisional Method on Fastness to Washing, Soaping, Laundering and Fulling of Dyed and Printed Cotton Against White Cotton

THE following provisional method on "Fastness to Washing, Soaping, Laundering and Fulling of Dyed and Printed Cotton Against White Cotton" is published by George A. Moran, Chairman of the Sub-Committee of the Research Committee which was appointed for this purpose.

In submitting this report the Research Committee wishes it definitely understood that it is provisional and is open for suggestions or discussions on the part of the members of the Association, or any others who may be especially interested.

This method will not be adopted as an official

method until sufficient time has elapsed to give everyone an opportunity to make any criticisms or suggestions that may be necessary for its improvement, and with this in mind the Research Committee specially invites such comment.

The subject of the fastness to fulling is not included in this report, as it is being separately considered. It will be reported upon later.

A—Fastness to Boiling Soap and Soda.

B—Fastness to Laundering.

C—Fastness to Mild Washing and Soaping.

D—Fastness to Fulling.

### A

#### FASTNESS TO BOILING SOAP AND SODA

This test subjects the colors to the severest treatment to which they should be subjected in a home washing.

This test is carried out as follows:

*Test A*—The material braided with an equal weight of white cotton, or sewed onto a piece of white cotton cloth, is treated at the boil for ten minutes in a solution of 5/10 per cent soap and 2/10 per cent soda ash

(58 per cent), stirring gently with a glass rod. The soap is to be a good grade of 88 per cent neutral chip tallow soap and the volume of liquor fifty times the weight of the goods. After ten minutes, lift, rinse twice in water at 105 deg. Fahr. for one minute each time, pass through squeeze rolls after each rinse, and dry by hanging in drying closet. Repeat this treatment three times.

#### *Classification*

1. When treated as in Test A the shade remains unaltered and white cotton remains untinted.
2. When treated as in A the shade is moderately altered, but the white is untinted.

#### *Type*

1. Alizarine Red—old method) or Naphthol AS developed with Fast Red G Base or Indanthrene Blue GCD DbI. Paste (842) 6 per cent dyeing, or Indanthrene Violet RR Ex. Paste (767) 16-ounce printed shade.

2. Ciba Scarlet G (907).



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 Proceedings of the American Association of Textile Chemists and Colorists
 

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<i>Classification</i>	<i>Type</i>
3. When treated as in Test A the shade is slightly altered and the white cotton is more or less tinted.	3. Sulphur Indone 2R Conc. (733) 12 per cent dyeing with twice the amount of Sodium Sulphide crystals—rinsed thoroughly in warm water but not after-treated—or Paranitraniline Red dyeing or print; full shade.
4. When treated as in Test A the shade is moderately altered and white cotton is badly stained.	4. Pyrogene Green 3G (709) 12 per cent dyeing—Primuline (616) 5 per cent dyeing.
5. When treated as in Test A the shade is considerably reduced but not destroyed. The cotton is not tinted.	5. Alizarine Blue S Pdr. (804) 4-ounce printed shade fixed with Acetate of Chrome, or Indigo Blue (874)—medium navy shade dyed in four dips in the hydrosulphite vat and thoroughly rinsed—or Pigment Ultramarine Blue or Lampblack printed shade fixed with Blood Albumen, 1 pound to the gallon of printing color, and steamed one hour. Shade to be a full deep shade.
6. When treated as in Test A the color is very nearly destroyed and the white cotton is more or less tinged.	6. Indoin Blue EB (126)—2½ per cent dyeing on a 6 per cent Tannin Mordant fixed with Antimony Salts—or a 4-ounce printed shade or Methylene Blue B (659) dyed or printed shade as above.

Colors which come under classification No. 1 should be satisfactory for any home washing treatment. Those coming under classification No. 2, while not equal to No. 1, should be reasonably satisfactory. The

other four classifications will prove more or less unsatisfactory when subjected to the severest requirements, but may be satisfactory when subjected to less severe treatment.

## B

### FASTNESS TO LAUNDERING

This test applies to colors that are to be washed by power laundries and which should stand the treatment for washing cotton fabrics as prescribed by the Laundry Owners' National Association.

This test is carried out as follows:

*Test B*—The material braided with an equal weight of white cotton or sewed onto a piece of white cotton cloth is treated in a solution containing 1/10 per cent soap and 1/10 per cent soda ash, at a temperature of

160 deg. Fahr. The soap is to be a good grade of 88 per cent neutral chip tallow soap and the volume of liquor fifty times the weight of the goods. Stir vigorously with a glass rod for ten minutes, rinse in water at 160 deg. Fahr. and dry; repeat this test three times. Then treat for ten minutes at 150 deg. Fahr. in a soda chemic solution containing 1/100 per cent available chlorine, rinse and treat for ten minutes at 105 deg. Fahr. in a solution containing 1/20 per cent oxalic acid. Rinse and dry.

<i>Classification</i>	<i>Type</i>
1. When treated as in Test B the shade is unaffected and white cotton is untinged.	1. Alizarine Red—old method. Indanthrene Yellow G Paste (849) 6 per cent dyeing—Indanthrene Violet RR Ex. Paste (767) 16-ounce printing color. Naphthol AS developed with Fast Red G Base.

# American Dyestuff Reporter

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TO

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*Classification**Type*

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|--|--|
| 2. When treated as in Test B the shade is somewhat reduced but white cotton is untinged. | 2. Brilliant Indigo B (885) 5 per cent dyeing or 4 ounces to gallon printed shade. |
| 3. When treated as in Test B the shade is considerably affected.                         | 3. Alizarine Blue S (804) printed shades. Sulphur Black (720).                     |
| 4. When treated as in Test B the shade is badly affected.                                | 4. Methylene Blue B (659) dyed or printed shade.                                   |

Colors which come under classification No. 1, Test B, possess satisfactory fastness to laundry treatment. Those that come under classification No. 2, while inferior to No. 1, should stand laundry treatment satis-

factorily unless subjected to extra severe treatment. Those coming under classification No. 3 and classification No. 4 will not stand laundry treatment in a satisfactory manner.

## C

### FASTNESS TO MILD WASHING AND SOAPING

This test applies to colors that do not stand Test A or B but do possess moderate fastness to washing if treated carefully and at a low temperature.

The test is carried out as follows:

*Test C*—The material braided with an equal weight of white cotton, or sewed onto a piece of white cotton cloth, is subjected to the action of a 2/10 per cent soap solution at a temperature of 120 deg. Fahr. for three

periods of five minutes each, squeezing after each treatment so as to leave 100 per cent of its weight of liquor in the goods. The soap is to be a good grade of 88 per cent neutral chip tallow soap and the volume of liquor fifty times the weight of the goods. The goods are then lifted, rinsed twice in water at 105 deg. Fahr. for one minute each time, squeezing after each rinse, and dried by hanging in a drying closet.

*Classification**Type*

- |   |  |
|---|--|
| 1. When treated as in Test C the dyeing is unchanged and cotton is not stained, or, but, slightly tinted.                                 | 1. Five per cent Primuline (616) dyeing diazotized and developed with Beta-naphthol, New Methylene Blue N (663).   |
| 2. When treated as in Test C the dyeing is only slightly changed, bleeds but little, and the cotton is only stained to a moderate extent. | 2. Diamine Sky Blue (426) or Benzo Fast Blue 4GL or Diamine Fast Blue FFB, or Diamine Fast Orange EG—3 per cent dyeings at the boil for one and one-quarter hours with Glauber salt. |
| 3. When treated as in Test C the color bleeds badly and stains the white to a considerable extent.  | 3. Chrysopheneine G (304) or Benzo Fast Red 8BL—3 per cent dyeings. Dyed at the boil for one and one-quarter hours with Glauber salt.  |



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*Classification**Type*

4. When treated as in Test C the color is almost completely washed out and white cotton is more or less tinged.

4. Croceine Scarlet 3B (249) or Soluble Blue (539).

Colors which come under classification No. 1, Test C, should stand ordinary home washing if carried out at low temperature with a good grade of soap. Classification No. 2 will stand, in medium and light shades, a home washing if carried out with care and at low temperatures and a good grade of soap. Classification No. 3 will not stand washing satisfactorily. Classification No. 4 will not stand any washing.

Results that are intermediate between the above-selected types may be indicated by plus or minus the type to which they are nearest in fastness. Pre-war names have been used for the type dyestuffs as being more definite and better known. Most of these dyestuffs are produced domestically and offered by various manufacturers under well-known trade names, and can equally well be used as types.

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## Communication from the President

There have now appeared in the Proceedings provisional methods for the testing of dyed cotton, wool and silk material as regards fastness towards washing, scouring and in the case of wool and silk, fulling. The method for fastness of dyed cotton in material which is fulled, is yet to be reported.

It is desirable that every member fully understand that these methods are provisional, and that they will not be accepted by the Council as official methods, until sufficient opportunity has been given for every member as well as other interested persons to express his opinion as to how they might be modified, revised or extended in order that they may best answer their desired purpose.

While we have as yet received no direct comment in regard to these proposed methods, we have indirectly heard that there are those who believe that they might be modified or improved in certain ways. As far as can be learned the Council and Research Committee have officially received no such comments or recommendations, neither have they been able to ascertain just the nature of the suggested improvements.

The object of this communication is to again impress upon every member of the American Association of Textile Chemists and Colorists the fact that the Council and Research Committee are simply your representatives in this matter and, after several months' deliberation, they have presented for your

consideration what they, in the light of all information at hand, believed to be the most satisfactory methods.

It is far better that all criticisms should be made immediately, so that the Research Committee will have sufficient opportunity to consider them and, if thought best, incorporate them into the final methods which will eventually be submitted for adoption.

It is therefore earnestly requested that each member will carefully study these provisional methods as they appear and immediately report to the various chairmen of the sub-committees their views in regard to them.

For your convenience it may be stated that the provisional method on "Fastness of Dyed Silk to Washing, Scouring and Fulling" appears on page 70 of the Proceedings in the May 22 number of the AMERICAN DYESTUFF REPORTER; the method on "Fastness of Dyed Wool to Scouring, Washing and Fulling" on page 54 of the Proceedings in the issue of May 8, and the provisional method for "Fastness of Dyed Cotton to Washing and Scouring" in the Proceedings of the present number.

William D. Livemore is Chairman of the sub-committee on "Fastness of Dyed Wool to Scouring, Fulling and Washing." Walter M. Scott is Chairman of the sub-committee on "Fastness of Dyed Silk to Washing, Scouring and Fulling," and George A. Moran is Chairman of the sub-committee on "Fastness of Dyed Cotton to Washing and Scouring." Communications

in regard to these may be addressed to them directly or to the President or Secretary of the Association.

It is extremely desirable that the Proceedings of the Association should occupy four pages or a multiple of four pages in each issue. In this way it is possible for every member if he so wishes to remove the Proceedings of the Association and have them bound separately. It is a very difficult matter, however, to have the material for publication come out just right. Oftentimes, it is necessary to withhold some material which we would like to publish very much, but owing to the fact that we cannot fill another four pages its publication has to be postponed. The only way to obviate this difficulty would be to have on hand at all times sufficient material to fill in the whole four pages. This could be done if the individual members would furnish us with short communications in regard to various matters of interest to the Association as a whole, also any items of news either personal or otherwise which they believe would be of interest.

It is earnestly requested that the members of the Association seriously consider this matter and if possible assist the editors by furnishing them with a certain amount of material of this type. We should also be pleased to receive any suggestions in regard to the nature of the material which has been or which might be published in the Proceedings.

L. A. OLNEY, President.

### ELECTROMETRIC TITRATION AS A MEANS OF DETERMINING THE FREE SODIUM SULPHIDE IN A SULPHUR BLACK DYE BATH

By W. WALKER RUSSELL and SAMUEL T. ARNOLD

(Concluded from page 71.)

The pipette first filled is drawn down to the mark and the tip is at once immersed in its respective iodine solution. The same procedure is carried out with the second pipette. The tip of the first pipette is kept well under the surface of the iodine solution, as the dye bath sample is released and the whole well stirred. The pipette is rinsed into the solution and 25 cc. of N/10 sodium thiosulphate<sup>8</sup> are added, after the iodine has been allowed to react for one minute. This same procedure is immediately carried out with the second pipette. The samples are now ready for back titration with iodine, the dyestuff being present as a suspended precipitate which soon settles and leaves a clear solution.<sup>9</sup>

The beaker containing one of the samples is placed in

the electrometric apparatus with the two electrodes dipping into the solution as previously described. Iodine is added as rapidly as is feasible, taking the largest permanent deflection of the galvanometer needle as the end point. In case of running by the end point a few drops of thiosulphate are added, and an end point located by adding iodine drop by drop. The deflection of the galvanometer is much more pronounced when adding the oxidizing solution.

The scale of equal parts on the apparatus is very useful in locating end points in case the amount of the reagent that will be required is not very closely known. It has been the experience of the writer that the end point is always indicated by the largest movement of the slider (the amount of resistance it is necessary to put into balance the galvanometer for the addition of a given amount of reagent) and that this maximum movement always takes place over the same portion of the scale for determinations carried out in like manner. Therefore, in this determination, iodine may be added rapidly until the position of the slider indicates the close approach of the end point. Since the large permanent deflection indicating the end point is very sharp for the addition of one drop of N/10 iodine, the use of the scale is arbitrary. The sharpness of the deflections depends somewhat upon the condition of the platinum electrode. The solution now contains a precipitate and some sulphur may be in suspension. Therefore, it has been found good practice to ignite this electrode to redness between titrations, thereby destroying any film which rinsing might not remove.

By using this method, it has been possible to obtain checks in duplicate determinations accurate to within less than 0.5 per cent of the actual amount of free sodium sulphide present. Here, as in the distillation method of Swann already referred to, it is shown that the total sulphide content is not indicated by the titrations, but rather that portion of the sulphide which has not combined with, or reduced the dyestuff.

A typical titration is given to show this.

Two baths were prepared containing the same amounts of sodium sulphide. The first contained no dye, while the second contained one gram of sulphur dyestuff:

	Amount of Dyestuff	Na <sub>2</sub> S.9H <sub>2</sub> O Indicated
1	0 gm.	3.2157 gm.
2	1 gm.	2.9887 gm.
Difference		0.2270 gm.

Several titrations are included which were carried out according to the preceding method:



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Nos.	Sample	CC. of	
		Iodine	Per Cent of $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$
		Required	Present
1 (a) . . . . .	50.37 cc.	57.53	1.357
(b) . . . . .	50.24 cc.	57.43	1.359
<hr/>			
		1.0116 N/10	
		CC. of	
		Iodine <sup>10</sup>	
		Required	
2 (a) . . . . .	50.37 cc.	55.65	1.342
(b) . . . . .	50.24 cc.	55.75	1.348
2 (a) . . . . .	50.37 cc.	49.43	1.192
(b) . . . . .	50.24 cc.	49.09	1.187

A method is offered whereby the amount of free sodium sulphide in a standing sulphur black dye bath may be determined. The determination is accurate to within

less than 0.5 per cent of the free sodium sulphide actually present. In practice, it is suggested that a single titration carefully carried out will give sufficiently accurate information as to the sulphide content of a sulphur dye bath, since this content is always changing.

<sup>8</sup> Thiosulphate in excess of the amount necessary to react with the free iodine present is added.

<sup>9</sup> At this point, if it is not desired to use the electrometric method, which is both quick and accurate, the contents of the beaker may be rinsed into a liter flask and made up to the mark. Samples may be removed by means of a pipette after the precipitate settles, or the solution may be filtered and a sample taken from the filtrate. By either way we obtain a perfectly clear liquid which may be back titrated with iodine, using starch as an indicator

<sup>10</sup> The iodine solution used in this work was standardized against carefully prepared barium thiosulphate by means of the electrometric apparatus

Note—The last two sets of titrations (2 and 3) were made on the same bath, but carried out one week apart, the bath in the meantime having been kept in a tightly stoppered flask.

### EIGHTH COUNCIL MEETING

The eighth Council meeting of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., on Friday, June 9, 1922.

The following members were in attendance:

L. A. Olney  
 William D. Livermore  
 William H. Cady  
 George A. Moran  
 A. E. Hirst  
 W. M. Scott  
 Winthrop C. Durfee  
 W. E. Hadley  
 William K. Robbins

By vote of the Council, it was decided to hold no further meetings of the Council until September, the date of said meeting to be decided upon by the President.

The Secretary presented the names of thirteen applicants for Active Membership and six applicants for Junior Membership, and these names were carefully considered by the Council. In some instances more information was desired as to the qualifications of cer-

tain of the applicants, and the Secretary was instructed to obtain same. The Secretary was instructed to immediately send out the list of names in accordance with Article IV of the Constitution, and at the expiration of thirty days, if no objections are filed, those applicants who were considered satisfactory by the Council will be elected to membership. Membership applications received from now on will be presented at the first meeting held in September.

A petition for the formation of a Local Section of the Association was received from Prof. E. C. Bertolet, of the Philadelphia Textile School, together with letters from twenty-six members residing in that locality. The Council approved the formation of this Local Section, and appointed Prof. Bertolet Chairman Pro-Tem, with authority to proceed with the formation of such section.

By vote of the Council the boundaries of the Philadelphia Section shall be as follows:

The entire State of Pennsylvania, New Jersey south of a line including the city of Trenton and extending eastward to Atlantic Ocean, and the entire States of Maryland and Delaware.

Respectfully submitted,

WALTER E. HADLEY, Secretary.

# AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY

PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL

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## A BRITISH WARNING

**T**WO recent events in the dyestuff field in England are full of significance for the dyestuff industry in this country.

The first is the resignation from the directorate of British Dyes, Ltd., of Dr. Herbert Leinstein on the frankly stated ground that the direction and control of this organization is not in expert and technical hands, and that the dyestuff industry can never be established successfully in England until this is done. Dr. Leinstein cites the well-known organizations in Switzerland and Germany, with their expert direction and management, as instances of the way in which the industry should be conducted.

The second incident is the address delivered at the annual meeting of the British Cotton and Wool Dyers Association by the Chairman, A. N. Hoegger. In this address he uses the following language:

"As large shareholders in the British Dyestuffs Corporation, and with all due respect for the high business qualities of the members of the Board of Directors, may I most respectfully suggest that the sooner a manager possessed of the best possible chemical knowledge, technical training and great experience in the dye-making industry is put at the head of affairs, the better it will be, not only for the color-using community of the country but also for the shareholders of the British Dyestuffs Corporation. [Hear, Hear!] The success of the German and Swiss color works is due entirely to having men at the head of affairs who are unexcelled in technical training and experience. The highest talent is required, and the greatest possible efforts must be made in perfecting our dye-making industry, if we wish to retain our former supremacy in the textile trades of the world." [Applause.]

It is interesting to observe how exactly parallel have been the conditions and surroundings of the dyestuff in-

dustry in this country to those in England. The same motivating impulse to create a dyestuff industry was felt in both these industrial countries; the same efforts to establish it were made in both countries. Although in England it received the active support of the Government, the same obstacles had to be overcome and the same opposition on the part of the textile trades had to be met. The same lack of cohesion and unity of effort among the dyestuff manufacturers themselves was experienced and the same efforts to throttle the nascent industry on the part of the Interessen-Gemeinschaft had to be confronted. And now comes to the front a plainly stated possibility of danger to the British industry which is equally a menace to it in this country. It must be evident to anyone giving any thought to the situation that the gentlemen who are in active control of the American dyestuff industry are not usually men who are familiar with or have had any technical training and experience in the chemical field. They are not familiar with the precedents and traditions of the industry nor do they have the necessary familiarity with the trades served, or with their requirements and technique. In practically all of the large and leading companies is this the case, and the executive managers have, almost without exception, come from the ranks of other activities.

They are bankers, lawyers, merchants—but are not dyestuff manufacturers. Their abilities in these other paths of endeavor are marked, but they do not have the vision that is necessary to put the American dyestuff industry where it should be and to keep it safe from assault and injury. It is because of their unfamiliarity with these aspects of the business that the counsels of timidity, of vacillation and of unwise secrecy have prevailed throughout the three years of effort to secure recognition of the vital nature of the industry from Congress. And it is due to this unfamiliarity as much as to anything else that the industry has steadily lost ground in public estimation and occupies to-day a worse position than it did in 1919 when the Longworth Bill was introduced.

Is it not time for the American dyestuff industry to question itself as seriously as the British industry is now doing, as to whether it is not necessary for its future and continued success that the active and executive heads of the various companies should be trained, expert, and experienced dyestuff manufacturers?

We believe that most of those connected with the American industry, and particularly those who fully understand the very real gulf which lies between the possession of a thorough technical training and the lack of this essential background for efficient leadership, will be disposed to agree that it is. The theory that intelligence combined with inherent executive ability and a sound business and financial training, can, with the aid of expert technical counsel, successfully direct an enterprise in almost any field, does not appear to work out happily in the case of the dyestuff industry. Moreover, it is becoming more and more apparent that even when fortified by several years' actual administration of a dye manufacturing organization, these undeniably excellent qualities



remain insufficient. It would seem that no amount of native cleverness and adaptability can ever make up for the lack of such training as the heads of Swiss and German dyestuff companies have received, and in view of the fact that applied coal-tar chemistry is probably the most involved, tricky and complex manufacturing endeavor of mankind, this is not to be wondered at.

Nothing herein stated is set forth as the slightest disparagement of the soundness and ability of the present heads of American dye companies. It has merely become evident in a number of ways that the industry is on the wrong track in trying to make dyestuff technicians of its executives.

Would it not be better, therefore, to face about and attempt the more logical procedure of making executives of the technically trained dye men?

### COMPETITION FROM REPARATION COLORS

IN its discussion on June 5 of the situation arising from the sale to German interests of the control of the Bianchi dye manufacturing firm in Italy, The REPORTER cited the competition which Italian dye makers had received from Italy's allotment of Reparation colors, which, supplementing the further competition of licensed German imports, proved to be greater odds than the ill-equipped Italian industry could withstand. As a corollary of this, the situation in America was covered by the statement: "With the help of the artificially maintained war embargo, the American dye manufacturers have held even with the game, in spite of competition from America's Reparation color allotment."

It was this statement which chanced to draw the fire of several elements of the American dye trade, engaged more particularly in the sale and distribution of dyestuffs as opposed to the strictly manufacturing forces. Both telephonically and verbally The REPORTER was called to task for venturing upon any kind of an assertion to the effect that Reparation colors were in any way, shape or form competitors of American-made dyes. It was explained at some length by those interested that the greatest care, the most precise supervision, had been exercised with a view to preventing so undesirable an occurrence. It was further put forward that, so far from offering competition to American-made dyes, the Reparation colors supplemented the output of American manufacturers, and in many cases even served to stimulate the demand for the latter.

It was explained that the supplementary character of the Reparation colors was achieved in two ways: Colors not made here at all were imported in quantities necessary to supply the demand in accordance with the procedure determined upon shortly after the signing of the Armistice, and colors made here in quantities insufficient to supply 100 per cent of the demand

were imported in quantities to make up the difference.

Further than this, it was strongly brought out that by the judicious importation of specialties designed to be used in conjunction with various American-made dyestuffs, the sale of these was aided considerably.

Beyond a doubt the greatest care has been exercised to make this ideal a reality. Beyond a doubt the foregoing statements are entirely true—theoretically. But makers of American dyestuffs maintain, for their part, that they are not always wholly true in actual practice. Speaking for itself, The REPORTER is ready to concede that perhaps certain readers may have assumed, from its editorial statement, the competition from Reparation colors to be more severe than is really the case, or than The REPORTER intended to convey—for we believe the great majority to be well enough informed on this subject not to have taken it as an exaggeration of the facts, nor even to have given it a second thought. American dye manufacturers, too, agree that competition from Reparation colors is not necessarily severe enough to constitute, in itself, a grave menace. Nevertheless, they maintain that competition does exist and always must exist owing to technical limitations in the administration of our dye import control regulations.

As an example of this, the single instance of Cyanone Blue may be referred to. This product is made by several American manufacturers under the name given above; it is also made by Cassella, of the I. G., and sold by the latter under this name. Badische, however, makes and sells it under an entirely different name, with the result that importation of the Cassella product was refused on the ground that it was a competing color, whereas the Powers That Be, not knowing that the two were identical, and having no facilities for an analytical determination of this fact, freely admitted the Badische product.

This is but one instance. Others might be cited, but will probably suggest themselves to the reader. The conclusion, however, is that with the best intentions in the world our authorities are physically—or shall we say chemically?—incapable of preventing competition between Reparation colors and American-made colors in all instances.

### THE INDEX

With this issue, The AMERICAN DYESTUFF REPORTER prints an index of the subjects and authors included under Volume X. Technical articles appearing in the Proceedings of the A. A. T. C. C. are listed in their proper alphabetical positions in the regular REPORTER index, with REPORTER page numbers. A full index of the Proceedings will be printed at the close of the Association's fiscal year, or in the second December, 1922, issue of The REPORTER, in accordance with the decision of the Council. In this separate index, page numbers referring to Proceedings only, and appearing at the bottom of Proceedings pages, will be used.

## WARP YARN MERCERIZING

*(Continued from page 438)*

overflowing to the pumps, which discharge the liquor to storage tanks in the recovery plant.

The mercerizing action actually takes place in the re- is held under tension by means of the weighted squeeze rolls on each compartment. The compound formed between the caustic soda by water, while the warp yarn between the alkali and the cellulose  $C_{12}H_{20}O_{10} : 2NaOH$  is decomposed, the cellulose reappearing as the hydrate  $C_{12}H_{20}O_{10} : H_2O$ .

In order to be assured of the complete removal of the caustic soda, the yarn is passed through 3 per cent solution of sulphuric acid at normal temperature, care being exercised that the warps do not enter the acid at an elevated temperature, and to guard against this conditions the last caustic wash should be cold. The strength of the acid should be maintained within very narrow limits, and frequent titration tests should be made to determine its strength. The acid is removed from the yarn by thoroughly washing with cold water. Too much stress cannot be laid upon complete removal of the acid, since the slightest trace remaining will become concentrated in the subsequent drying operation and cause tendering. In addition to this evil, the faintest trace of acid causes reversion of the cellulose hydrate to cellulose and produces an uneven appearance when the yarn is dyed. In fact, when closely examined the parts dyed lighter in shade have the appearance of unmercerized yarn.

The final treatment on the machine is the softening process, the yarn passing through a weak solution of Turkey Red Oil, or some other oil used for this purpose.

The warps on leaving the machine pass directly to a series of drying cylinders, the number of which depends entirely on the weight of yarn to be dried and the speed at which the operation is conducted. On leaving the drying cylinders the warps are **plaited** or coiled in boxes, after which the binder thread is removed in a separate operation and the individual warps of 378 ends are split out, in which condition they are delivered to the winding department.

The caustic wash liquors from the machine are evaporated in a multiple effect evaporating system to a concentration of about 80 deg. Tw., and again reused for mercerization. In a well-controlled plant, 85 per cent of the caustic soda used can be recovered.

In order to obtain the best luster only combed yarns should be used, as the fibers lie parallel. The mercerizing process tends to shorten every individual fiber and this shortening is resisted by tension applied in a direction parallel to the axis of the thread. Hence, the greater the angle a thread makes with that axis, the less is the effect of the tension, and if any portion of the fiber is at right angles to the axis, it is not affected by the tension at all. A simple warp thread, therefore, can only receive a partial luster from mercerization, and the greater the twist the less the luster. Slightly twisted threads must give the

best luster, although there is a limit to this slackness of twist, for if the cohesion of the fibers is less than the contractile force exerted by the caustic, the fibers slip past each other and no luster is produced. Short staple cotton lusters badly, because it must be more tightly twisted.

Singeing or gassing the yarn prior to mercerizing adds considerably to the resultant luster, as the surface of the yarn is improved by the removal of the hairy fibers, which if allowed to remain, shrink up by the action of the caustic, thereby presenting an uneven reflecting surface.

The luster of mercerized yarn is due to surface reflection, which is brought about by the swelling action of the soda and the untwisting of the fiber while under tension. The fiber thus treated presents the appearance of a straight rod with a surface possessing a smooth appearance. The reflecting surface of mercerized cotton may be compared to the surface of still water, whereas the wrinkles on the surface of unmercerized cotton correspond to the small waves when the water is disturbed, the reflecting surface becomes dull as the rays of light are scattered in every direction.

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The Dawhoo Chemical Company, Charleston, S. C., has been chartered under State laws. The incorporators are J. P. Matthews and E. Hisher, both of Charleston.

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Jersey Knitting Company, Springfield, Mass., has been incorporated with capital of \$50,000. It is a part of the Potter Knitting Company, and will take over the colored goods department of the latter. The incorporators are Theodore W. Ellis, John H. Mitchell and H. L. Coolidge.

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A system of licensing for imports of dyestuffs into Japan has been proposed and will likely be adopted within the next few months, American Trade Commissioner Butts, at Tokio, cables to the U. S. Bureau of Foreign and Domestic Commerce. Mr. Butts states, however, that the system is not expected to be inaugurated in less than three months, and that the public will be given advance notice of at least thirty to sixty days.

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The John Cowan Chemical Company, Ltd., 179 Common Street, Montreal, Que., is planning for the rebuilding of the portion of its plant destroyed by fire April 26.

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The Hooker Electrochemical Company, of Buffalo, has purchased for \$130,000 the chemical plant of S. Wander & Sons Company, at 135 Church Street, Albany, N. Y. The sale was made by order of Edwin A. King, referee in bankruptcy. S. Wander & Sons Company were recently adjudged bankrupt.



# The Padder in the Dyeing of Cotton Piece Goods

A Paper Presented at the Twenty-first Annual Meeting of the Alumni Association of the Philadelphia Textile School

By JOSEPH M. KAEPLER

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MUCH depends upon the ability of the operator in getting the best quality of dyeing from a padder. In a large plant where the foreman cannot give his personal attention to the necessary repairs for the machines, the operators must be considered as semi-skilled laborers. In this case a bonus system would work to good advantage. By the good work of the operators the foreman can have all his padders turning out first-class dyed goods.

There are many reasons why unsatisfactory results are obtained or faults crop up in the use of a padder. Padder dyeing is carried out at a speed of about 160 yards per minute. It requires, first, a thoroughly boiled-out fabric that is absolutely and uniformly wet out immediately it is brought in contact with the dye solution. If at any time in the process of dyeing a lot the goods should show a cloudiness or resist because of insufficient kier boiling, the attention of the foreman should be called to note this.

Defects in the squeeze rollers is another thing, to detect which a good padder-man will always be on the alert. He should show care in not letting knotty sewings go through the nip of the squeeze rollers, as frequent occurrence of this will cause a series of dents to form in the rubber rollers. This is especially true if the rubber is very hard or has had long service and been buffed off many times. These holes or dents produce a cloudy and mottled effect which can be corrected with no little extra cost to the lot.

Pieces in this condition usually find their way to the chemic pits, where they are stripped of the color and returned for redyeing. If a padder dyer never has goods to strip he will always turn out good work, because a redyed, stripped lot will very rarely pass as first-class goods. It seems that any amount of care can be shown in the souring off, but there is always just a small quantity of chlorine in the fabric to change the dyeing from normal. Of course, all the pieces of the lot will not contain the same amount of chemic, so this means any number of cast in the resultant goods. If this is the case, the packer will find that he has D and E shades to pack as well as A, B and C. In other words, five shades or more will be the result in the complete lot.

Stripping not only reduces the quality of the color but also lessens the value of the fabric. Many times in the process of removing the color the tensile strength is reduced 15 per cent more.

Cloudiness in a piece cannot always be removed as readily as would be thought. While stripping will remove it to the extent that it will not be as noticeable as when first dyed, the unevenness is never completely eradicated. When treated with chemic most dyed shades are prone to revert to yellow bottoms and the result is that the heavy places in a cloudy piece will show a deeper cast of yellow than the lighter areas upon stripping. Upon redyeing the goods this fact will influence the shades, and while there will always be an improvement over the first appearance, there still remain slight signs of cloudiness.

A dust hood over a padder is a very necessary piece of auxiliary apparatus if clean goods are wished for. It might not only serve to keep floating lint and dust from the goods and rollers, but will catch the contents of an oil drip pan that has been knocked from a shaft hanger by a broken belt. In the latter case the oil might be of a large volume and soon drip through the cloth dust hood, but it will, nevertheless, give the operator an opportunity to move the goods without serious damage. The hood can be made of gray goods seconds and tacked over the padder in tent fashion above the overhead tension rails. It is to an advantage to make it of damaged material, as the hood should be cheap enough to throw away. They soon get dusty and filled with grease; then it can be torn down and replaced by a clean cloth. It should extend over the butchering-up machine, in order to give protection to the dyed goods as well as to the front end, under which the goods are in the white. Dirty hoods are almost as troublesome as no hoods at all, so it is very necessary to give them frequent dustings. Night seems to be the proper time to do this, after all the machinery is shut down and no damage can be done the rubber rollers. All the dust will be settled by the next morning, and can then be swept up with damp sawdust. This will, however, not be necessary if most any one of the numerous patent anti-dust treatments has been given the floor.

Even with this hood protection for the goods, it is necessary to clean the rafters or I-beams of the padder room, as these unfailingly collect a thick layer of oily dust or lint. An ordinary breeze from a ventilator can loosen a piece as large as a hand and float it in the air for 15 or 20 feet, at the end of which it might fall on some cloth and cause a huge grease spot that is difficult to remove.

When the goods are being threaded through the overhead tension rails the operator should be sure that he has led them beneath enough rails to give required drag, or the goods will snap or flop when being run from the lap. The flopping of the goods will cause the dye liquor to splash away from the nip, and the result will be spots in the finished piece. These spots resemble those produced by dents in the rubber rollers, but they will not appear periodically like the latter. Careless threading of the overhead tension rails will yield a series of spots throughout the pieces, and the making-up department will lose at least half a yard from each set of spots. It is difficult to tell how many short pieces a double cut will yield if the flopping once starts at the front end of the padder.

A 1½-inch brass pipe rigged very securely close to the bottom roller and about 2 inches below the level of the nip will act as a hood bar. This prevents the hot dye liquor from flooding out over the cloth, thus streaking it. It also helps a great deal toward keeping the goods straight while passing under the spray pipe of the dye liquor, thus preventing nipping. This flood bar will not replace the stretchers of a padder, but will keep the goods spread out if they are passed through a Mycock stretcher or over a crimp bar placed about a foot or foot and a half from the nip.

Brass rollers have been successfully substituted for rubber in the bottom rollers of a padder. This does not hold good for all grades of goods, as the trouble lies in shifting from dark to light shades. Light cloth of plain weave can be run without any harm, but twills and pocketing will cause no end of trouble. The brass foundries are unable to cast brass rollers without numerous little pits or holes occurring on the surface. Turning the rollers down on the lathe does not improve the surface, but rather reveals additional holes. The concentrated dye liquor of the dark shades gets into these little pits, and if allowed to dry overnight will crystallize. It is then in readiness to cause trouble for the dyer when he wants to start running a light shade. Instead of the customary fifteen or twenty minutes for chemicking out a machine, the brass rollers will necessitate a one to one and one-half hour's cleaning. Even then it is often necessary to run cast-out seconds to absorb the dye from the pit holes in order to complete the cleaning. Where a machine runs but one shade, or where thin goods only are dyed, a brass roller will be a saving, as the initial cost is the last. They can be run indefinitely without being buffed off, while the double rubber rollers need constant attention, or the machine will be turning out pieces with light selvages and dark centers. This same trouble can be had with a brass and rubber roller padder, but there is only one roller that needs to be looked after in this case.

The majority of the shades dyed by a padder are light, and consequently show dye specks and iron rust very readily. Probably the best plan for putting a stop

to this is to outfit the padder completely with brass and lead fittings. Lead can be used for linings of the tubs and roller boxes, while brass pipes and fittings should be used for the water supply lines, with the same for the dye liquor feed pipes. This will stop rust spots; but the hardest of all spots to stop occurring are dye spots.

Without a doubt they are caused in most cases by the proximity of the drug room to the padders. The drug room is best that is removed as far as possible from the padders. It should be provided with a swinging door and this kept locked and used as infrequently as possible. It is rather a good plan to have a low sliding door through which the drug-room man can serve out the dye pails. Before he hands them through the window he should assure himself that all the dye has been dissolved and no dry particles are floating upon the top of the dye liquor.

Some dyes are so hard that they refuse to absorb water and, even after repeated stirring, float on the surface, ready to be wafted away by the first current of air into the padder room. This can be overcome to a great extent by first working the dye into a paste with a small quantity of water, and then diluting to a perfect solution. This is not necessary with all dyes, as some are so very soluble that just a quantity of water dashed on them will completely and immediately dissolve them.

The minimum amount of caution and trouble in dissolving dyestuffs can only be obtained by constant daily practice in the drug room. The help in the drug room should be instructed to never fill a dye pail to the top. A full dye pail is not only inconvenient to carry, but especially dangerous if filled with hot water. This dye liquor when it is splashed on the floor will evaporate, and since it is a concentrated solution the dye will crystallize. Then it will be loosened and kicked into the air, only to light on some sample piece of cream or light tan shade.

The washing of dye measures and pails after they have been returned from the padders to the drug room is also worthy of note.

In weighing out dyestuffs all manner of care can be shown, but there will always be some of it split on the table upon which the balances rest. The most natural thing for the help to do would be to set the dye pail and measure on this table that is nearest to them. In doing this the dyestuff adheres to the bottoms of the measures and is in turn carried out into the padder room. Each measure should be washed thoroughly after returning to the drug room. Another good way to remedy this fault is by having a shelf built overhanging the balances about the height of a man's shoulder. Divisions can be made on this shelf to keep the measures of each machine in their respective order. The drug-room man must then form the habit of setting the measures in no other place than on the shelf. Clean paper might be placed on the shelf as an added



precaution, and renewed every evening just before the workmen leave.

In addition, the drug-room help should not be permitted to walk around the padders. Their clothing is usually covered with a fine dye powder, which will inevitably drop off and float in the air, only later to cause some trouble. The writer recalls an incident where all the pieces turned out by a certain mill for a period were well spotted with blue dye spots. An entire afternoon was taken up in sweeping and washing the floors, walls and overhead beams. The next morning work was resumed with all confident that the blue specks had gone with the cleaning; but they had not. By chance one of the help leaned against a damp roll of goods that were freshly dyed. The result was a mass of blue where his clothes had come in contact with the damp cloth. That evening all the workmen were asked to wash their clothing and instructed to return with clean garments the next morning. Dye specks became a rarity after that, and later disappeared altogether.

There is no other department that can help the starching room make gains in yardage as much as the padders. Some padders batch the goods upon wooden centers or rollers by putting the gudgeons in a swinging bearing, then wrapping the cloth about the roller

and resting it against the upper squeeze roller. This type of padder when stopped damages about the smallest amount of goods than any other. When the roller is filled with the batch of goods the padder can be stopped with but a few inches of the next piece through the nip of the squeeze rollers. The cloth can then be torn at the sewing and the full batch swung out of place, while the few inches of the new piece are twisted around an empty center, ready to run up another batch.

Another method of batching-up is a separate machine placed at the back end of the padder, which is driven by a belt from a pulley forced onto the shaft of the drive squeeze roller. The "batching-up" rigging consists of two brass rollers about 10 inches in diameter, upon which the batch roller is placed and revolved, thus winding up the goods. This type batching arrangement is usually low, and it is necessary to put it  $2\frac{1}{2}$  feet from the nip of the squeeze roller so that the large roll of cloth will clear the dye box. This distance causes considerable loss of goods every time the machine is stopped, and calls for some attention to reduce the loss to a minimum. An excellent plan for stopping this loss is to have the sewing room sew end cloths on both ends of the batches. They should be cut at least 2 yards long, and longer if possible, and could be made from seconds out of the gray room.

## Hydro Extractors: Their Use and Abuse

Causes of Trouble—Personal Element—Basket Deterioration—Neglect—Improper Loading—Defective Materials—Fatigued Materials—Excessive Speed—Ignorance—Lack of Proper Precautionary Measures May Produce Irksome Legislation

By HARRY H. STEPHENS

**N**UMEROUS articles pertaining to centrifugal hydro-extractors have been published, presumably for the guidance of users of high-speed apparatus, but in most cases the major portion of the article was given over to a discussion of forces and stresses, involving complex technical formulae, thus greatly impairing its value for the busy plant manager or superintendent, who has little time to wade through such figuring, and usually cares less, as he feels that if the extractor is properly designed he need not worry, as that is up to the extractor manufacturer.

From reports of insurance companies we can trace the cause of many extractor difficulties down to: (1) Personal element; (2) basket deterioration; (3) neglect; (4) improper loading; (5) defective materials; (6) fatigued materials; (7) excessive speed, and (8) ignorance.

*Personal Element.*—This is by far the most important cause of any, for it embraces every person that has anything to do with the extractor from the time it is designed down until it is scrapped. The designer must be

competent. The manufacturer must see that these specifications are lived up to, and make constant tests to be sure material is as specified. The purchaser is responsible in the selection and buying of an extractor to secure a machine that will safely and satisfactorily do this work, and therefore his selection must be governed, within reason, first, by quality, then by price.

*Basket Deterioration.*—All baskets deteriorate with use, as far as physical strength is concerned, for the constant vibration to which these are subjected sooner or later will result in a weakening, due to crystallization of the basket material.

In addition to this, baskets that are used in contact with certain chemicals are subject to erosion by the chemicals. Unless temperatures are high—say, over 90 deg. Cent.—and unless the basket is subjected to severe handling, a method sometimes used is to coat the basket with hard rubber. However, even a fine crack in the vulcanized rubber will admit acid, which may cause eating away and weakening of the metal under the rubber. This cracking can be detected by applying an electrical test of about

2,000 volts to every portion of the basket when new; and this same test should be applied about once every three months, to detect any flaws that may have occurred in use. In the matter of rubber-covered baskets, only very stiff baskets should be used.

Many failures of rubber-covered baskets are due to the type of centrifugal in which the basket is run, and the worst offender is the old style extractor, or whiz, of which there are many still in use, especially in the silk throwing and dyeing and finishing trades. This extractor is constructed with rigid or fixed bearings, one bearing above and one below the basket; the outer casing being fastened securely to a large concrete foundation in the belief that by bolting such a machine down tight, it is made safe. In reality, the machine is made more dangerous by being fastened down tightly to a foundation, because the basket, even when badly out of balance, is compelled to rotate around a fixed center setting up tremendous strains in the basket, springing and distorting it out of shape, the result being that with a rubber-covered basket this continual springing of the basket out of shape very quickly cracks or ruptures the rubber coating and then the damage is done, for with an acid eating away and weakening the basket wall, the extractor soon becomes a dangerous machine to run. It therefore follows that a self-balancing extractor is the better type for uses where rubber baskets are necessary.

*Neglect.*—This is chiefly in evidence in connection with the operation and maintenance of the extractor. The writer has been in textile plants and seen extractors in constant operation that were without question absolutely dangerous, and to run a machine in such a condition is nothing short of criminal. He has seen repairs made on baskets where old material was used to save a few dollars, when the only fair thing to have done, both to themselves and to their employees, would have been to properly rebuild the basket. Yet the plant superintendents were apparently satisfied to run a little longer with a defective basket.

*Improper Loading.*—It cannot be disputed that any extractor will operate more efficiently, be freer from breakdowns, and have a longer life, if it will run free from vibration, for constant vibration will surely wear down and eventually destroy any piece of mechanism. When the extractor is completed by the manufacturer it is usually subjected to a running test for balance, and if properly erected the extractor will run smoothly if properly loaded. It is extremely important, therefore, that care be used in loading baskets evenly. The practice of loading two heavy bags of piece goods in a large basket directly opposite one another should be prohibited, and the load should be spread more evenly around the basket, because no extractor baskets are designed to carry a concentrated load at two points, and this will spring the strongest basket out of shape, and may cause a basket failure.

Many persons believe that the so-called "self-balancing" extractor will overcome all uneven loading. This is a greatly mistaken assumption. In the first place, the

term "self-balancing" as applied to extractors is a misnomer. No centrifugal possesses any real self-balancing features, for that would mean ability to run with excessive out-of-balance loads. "Self-balancing" extractors are self-balancing only by virtue of the character of load in the basket. If it is a non-flowing or not a self-adjusting load, like textile material, the machine will vibrate if not loaded evenly. On the other hand, in chemical work, like the handling of salt or sugar, where the load has a tendency to evenly distribute itself around the basket during the starting period then the so-called self-balancing extractor merely accommodates itself to the uneven load during starting. It is extremely important also that the extractor must not be overloaded beyond the amount the basket was designed to carry at the operating speed.

*Defective Materials.*—This has to do with the selection and use of proper materials in the extractor baskets, spindles, and bearings, as originally made by the extractor manufacturer, and also—just as important on the owner's part—the proper use of suitable materials in making repairs or replacements.

*Fatigued Material.*—It has been proved by actual tests that when most materials are stretched in use beyond their elastic limit, naturally with the reduction in sections the strength of that metal is considerably reduced. Now this is exactly what happens when you try to repair or reshape an extractor basket whose well or drum has stretched or bulged in operation. It is common practice to hammer a drum back into shape; but no amount of hammering can restore the strength.

*Excessive Speed.*—This may be caused either intentionally or unintentionally. Most persons do not appreciate the tremendous increase in the metal stresses of the basket caused by an apparently slight speeding up. For instance, if the speed on a 42-inch extractor, which normally runs at 850 r. p. m., be increased to 1,150 r. p. m. (only about 40 per cent increase), the basket strains are doubled and the factor of safety cut in half. In many textile processes there is a remarkable gain in economy of subsequent handlings if the extractors are run at comparatively high speed, and there is a great tendency towards higher speeds than were formerly used. This is all right if the extractors are properly constructed for these abnormal speeds, but it is a dangerous proposition to promiscuously speed up old machines without the advice of a competent engineer.

Steam-engine-driven extractors are likely to give trouble on account of excessive speed when their governors have been tampered with, or, as is sometimes the case, removed altogether. This puts the control of speed too much in the operator's hands; it is not only dangerous, but gives a product that is anything but uniform. The engine should be of suitable size to drive the extractor with the minimum steam pressure, and a positive pressure-regulating valve should be placed in the steam feed line beyond the operator's reach, so as to preclude the possibility of excess speed.



Extractors are often operated at a greater speed than necessary, due to the mistaken assumption that equal peripheral speeds develop equal centrifugal forces, and consequently give like drying effects. To disprove this, imagine yourself in a railroad train, traveling, say, 60 miles an hour. You will hardly notice going around a very gradual curve, but if the engineer attempted to take a sharp curve at the same high speed you would probably find yourself trying to go out of the window. Here is a case of equal peripheral speeds where centrifugal forces are entirely different, demonstrating that centrifugal force is proportional to angular velocity, not peripheral speed. It varies directly as the size of the basket and weight of load, but as the square of the speed.

*Ignorance.*—Most employers expect to and usually do trust the actual operation of their hydro-extractors in the hands of an unintelligent class of labor. Therefore, if the owner admits his help are ignorant, he must not expect them to act otherwise, and for obvious reasons he should not place in the care of such help any apparatus that will require thinking on the operator's part. He must, therefore, furnish the operator with an extractor that cannot be run at excess speed, and one in which the operations are so simplified that he does not have to think. If the owner does otherwise, he is acting in direct opposition to what he admits to be a correct and logical handling of the matter, and he is putting in the hands of unskilled or reckless workmen a chance to jeopardize lives and property. Many accidents are the direct result of recklessness or skylarking on the part of the employees, together with the inborn curiosity in all human beings to see what happens if they try something new.

Another brand of ignorance is thoughtlessly changing the speed of shafting which drives extractors as well as other machinery.

On the other hand, extractor manufacturers are greatly to blame for the ignorant handling of their extractors by manufacturers and operators. It seems almost incredible that any manufacturer would market a piece of high-speed machinery like an extractor without fully informing the operator in an effective way the maximum conditions under which the extractor should be run. Surely excess load and speed is the cause of many accidents, and yet some users are absolutely ignorant of what the limitations of their extractors are in speed and load, and they consequently make changes to suit their operations, trusting more to good luck than to good management.

Yet another case of ignorance is found in the practice of having extractors repaired or baskets rebuilt in shops not fitted either in equipment or in knowledge for such special work. It is a dangerous practice to have a boiler shop that knows nothing of basket design repair a basket, for the results and risk involved are not justified by the few dollars possibly saved. Such shops cannot know what is required, and cannot be expected to produce safe baskets. Making one basket look like another does not insure its being of the same strength, and it usually pays

in the end to go to the concern that originally made the extractor for any repairs or new parts.

Ignorance in applying the extractor to the job is often caused by the customer, in his anxiety to keep his process secret, giving the extractor manufacturer the scantiest of information. The result may be that of a customer asking for an extractor to perform quite an impossible task, or a manufacturer supplying an extractor which is afterwards found to be unsuitable.

To most persons an extractor is only a machine that rotates quickly; they do not realize the tremendous energy stored up during operation, and how fraught with possible danger the operation of these machines may become if they are run carelessly. While accidents will happen even in spite of the best of intentions, yet we must realize that if accidents become too numerous, the next step toward prevention will be extreme legislation that may impose great burdens on owners through unwarranted restrictions, requirements, etc. Therefore, let manufacturers produce only extractors that are as good as they can possibly be made, and let purchasers buy only the best and keep them in the best of condition. Then, and then only, shall we have done our share toward the proper use of centrifugal extractors.—"Cotton."

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#### FIXATION OF ALIZARINE RED IN CALICO PRINTING

A sample of bleached calico prepared with Turkey red oil was printed with a paste containing 100 grams Alizarine V 20 per cent, 500 grams neutral starch-gum tragacanth thickening, 100 grams aluminium thiocyanate 15 deg. Be., 30 grams of calcium acetate 15 deg. Be., 100 grams of acetic acid 78 deg. Be. and 170 grams of water. It was afterwards steamed to develop the color, and then thoroughly washed with hot and cold distilled water. Analyses of the printed fabric and the wash liquors showed that about 33 per cent of the alumina, 70 per cent of the lime, 10 per cent of the alizarine and 14 per cent of the Turkey red oil were removed from the printed fabric by washing.

In separating the oil from the alizarine, use was made of the solubility of the oil and the insolubility of the alizarine in petroleum. Distilled water was used for washing instead of a soap solution (as in large-scale practice), since with soap, fatty substances are fixed by the printed parts of the fabric.

When a printing paste, in which the constituents were diminished according to the above losses in washing, was used, very inferior shades were obtained. Hence, in printing alizarine a certain proportion of the color lake will be always unfixed and thus be removable by washing. In this respect the fixation of alizarine on cotton is similar to that of indigo.

# A Cross-Index of Green-Schultz and Schultz-Green Numbers

By H. WALES

(Sixtieth Contribution from the Color Laboratory, U. S. Bureau of Chemistry, Washington, D. C.)

THE following tables giving the numbers in Schultz's Farbstofftabellen 1914 edition, which correspond to the numbers in Green's Systematic survey of the Organic Colouring Matters, 1908 edition,

have been prepared for use in the Color Laboratory, U. S. Bureau of Chemistry. Several Schultz dyes are given in footnotes in Green. In such cases the *Green* number is given in italics.

## GREEN-SCHULTZ NUMBERS

Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.
1.....	5	44.....	—	88.....	139	132.....	182
2.....	—	45.....	71	89.....	142	133.....	—
3.....	6	46.....	—	90.....	—	134.....	208
4.....	7	47.....	74	91.....	140	135.....	209
5.....	—	48.....	75	92.....	141	136.....	210
6.....	—	49.....	76	93.....	146	137.....	211
7.....	31	50.....	77	94.....	23	138.....	212
8.....	137	51.....	78	95.....	134, 136	139.....	213
9.....	—	52.....	80	96.....	—	140.....	214
10.....	35	53.....	81	97.....	151	141.....	220
11.....	36	54.....	79	98.....	150	142.....	217
12.....	—	55.....	82	99.....	—	143.....	223
13.....	37	56.....	83	100.....	—	144.....	224
14.....	38	57.....	83	101.....	160	145.....	226
15.....	39	58.....	104	102.....	161	146.....	227
16.....	32	59.....	105	103.....	163	147.....	—
17.....	33	60.....	106	104.....	167	148.....	228
18.....	34	61.....	110	105.....	166	149.....	240
19.....	—	62.....	109	106.....	169	150.....	232
20.....	40	63.....	111	107.....	168	151.....	235
21.....	41	64.....	113	108.....	170	152.....	233
22.....	43	65.....	112	109.....	—	153.....	234
23.....	47	66.....	107	110.....	171	154.....	236
24.....	48	67.....	114	111.....	172	155.....	230
25.....	49	68.....	116	112.....	174	156.....	231
26.....	58	69.....	84	113.....	176	157.....	237
27.....	—	70.....	86	114.....	175	158.....	238
28.....	52	71.....	94	115.....	—	159.....	248
29.....	53	72.....	95	116.....	177	160.....	249
30.....	54	73.....	101	117.....	178	161.....	246
31.....	56	74.....	100	118.....	186	162.....	250
32.....	57	75.....	102	119.....	187	163.....	247
33.....	55	76.....	103	120.....	203	164.....	251
34.....	59	77.....	119	121.....	204	165.....	—
35.....	—	78.....	121	122.....	—	166.....	—
36.....	61	79.....	120	123.....	158	167.....	252
37.....	65	80.....	123	124.....	25	168.....	253
38.....	67	81.....	124	125.....	199	169.....	255
39.....	60	82.....	125	126.....	190	170.....	254
40.....	62	83.....	126	127.....	—	171.....	—
41.....	69	84.....	143	128.....	192	172.....	245
42.....	—	85.....	144	129.....	193	173.....	243
43.....	70	86.....	145	130.....	194	174.....	244
		87.....	138	131.....	—	175.....	274



Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.
176.....	—	243.....	313	310.....	408	377.....	473
177.....	262	244.....	320	311.....	410	378.....	479
178.....	263	245.....	321	312.....	411	379.....	477
179.....	—	246.....	322, 378, 409	313.....	417	380.....	480
180.....	275	247.....	324	314.....	412	381.....	481
181.... Sulphonated	275	248.....	327	315.....	418	382.....	482
182.....	276	249.....	328	316.....	421	383.....	486
183.....	266	250.....	329	317.....	423	384.....	485
184.....	269	251.....	333	318.....	419, 422, 424	385.....	487
185.....	267	252.....	326	319.....	426	386.....	488
186.....	—	253.....	334	320.....	413	387.....	489
187.....	270	254.....	337	321.....	414	388.....	—
188.....	272	255.....	354	322.....	416	389.....	—
189.....	271	256.....	352	323.....	428	390.....	—
190.....	294	257.....	353	324.....	427	391.....	—
191.....	296	258.....	331	325.....	429	392.....	—
192.....	—	259.....	356	326.....	430	393.....	491
193.....	—	260.....	357	327.....	380	394.....	1
194.....	—	261.....	358	328.....	303	395.....	—
195.....	297	262.....	355	329.....	304	396.....	2
196.....	279	263.....	—	330.....	305	397.....	3
197.....	283	264.....	—	331.....	—	398.....	4
198.....	291	265.....	360	332.....	301	399.....	9
199.....	292	266.....	—	333.....	302	400.....	9
200.....	290	267.....	—	334.....	—	401.....	10
201.....	284	268.....	376	335.....	—	402.....	10
202.....	285	269.....	394	336.....	—	403.....	12
203.....	286	270.....	392	337.....	—	404.....	18
204.....	287	271.....	395	338.....	—	405.....	11
205.....	—	272.....	362	339.....	—	406.....	11
206.....	431	273.....	—	340.....	—	407.....	13
207.....	432	274.....	374	341.....	—	408.....	13
208.....	433	275.....	373	342.....	—	409.....	15
209.....	434	276.....	393	343.....	—	410.....	—
210.....	295	277.....	363	344.....	—	411.....	14
211.....	300	278.....	364	345.....	—	412.....	205
212.....	—	279.....	365	346.....	—	413.....	207
213.....	483	280.....	366	347.....	—	414.....	206
214.....	484	281.....	370	348.....	—	415.....	16
215.....	—	282.....	367	349.....	444	416.....	17
216.....	350	283.....	369	350.....	445	417.....	770
217.....	315	284.....	371	351.....	440	418.....	769
218.....	—	285.....	372	352.....	439	419.....	772
219.....	317	286.....	375	353.....	438	420.....	931
220.....	342	287.....	377	354.....	447	421.....	771
221.....	351	288.....	381	355.....	446	422.....	773
222.....	—	289.....	382	356.....	451	423.....	774
223.....	—	290.....	—	357.....	450	424.....	775
224.....	—	291.....	387	358.....	452	425.....	493
225.....	340	292.....	388	359.....	456	426.....	494
226.....	343	293.....	391	360.....	436	427.....	495
227.....	344	294.....	386	361.....	437	428.....	499
228.....	347	295.....	397	362.....	442	429.....	496
229.....	348	296.....	396	363.....	448	430.....	500
230.....	349	297.....	399	364.....	443	431.....	497
231.....	345	298.....	398	365.....	449, 454, 457	432.....	501
232.....	346	299.....	404	366.....	453	433.....	502
233.....	—	300.....	—	367.....	455	434.....	504
234.....	319	301.....	401	368.....	461	435.....	505
235.....	314	302.....	—	369.....	459	436.....	506
236.....	306	303.....	402	370.....	460	437.....	—
237.....	—	304.....	403	371.....	478	438.....	—
238.....	310	305.....	—	372.....	474	439.....	546
239.....	309	306.....	406	373.....	475	440.....	543
240.....	307	307.....	405	374.....	467	441.....	544
241.....	316	308.....	—	375.....	468	442.....	545
242.....	312	309.....	407	376.....	470	443.....	509

Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.
444.....	549	511.....	586	578.....	—	645.....	—
445.....	510	512.....	587	579.....	669	646.....	656
446.....	523	513.....	588	580.....	670	647.....	657
447.....	511	514.....	589	581.....	678	648.....	658
448.....	512	515.....	590	582.....	—	649.....	—
449.....	513	516.....	591	583.....	—	650.....	659
450.....	514	517.....	592	584.....	679	651.....	660
451.....	515	518.....	593	585.....	680, 683	652.....	661
452.....	516	519.....	594	586.....	682	653.....	662
453.....	518	520.....	595	587.....	—	654.....	—
454.....	517	521.....	596	588.....	703, 704, 705	655.....	663
455.....	—	522.....	598	589.....	684	656.....	667
456.....	520	523.....	597	590.....	685	657.....	665
457.....	521	524.....	—	591.....	687	658.....	618
458.....	540	525.....	599	592.....	686	659.....	616
459.....	—	526.....	601	593.....	688	660.....	198
460.....	519	527.....	601	594.....	689	661.....	51
461.....	—	528.....	602	595.....	691	662.....	614, 615
462.....	524	529.....	603	596.....	692	663.....	617
463.....	525	530.....	605	597.....	696	664.....	611
464.....	527	531.....	604	598.....	701	665.....	610
465.....	526	532.....	606	599.....	697	666.....	612
466.....	528	533.....	607	600.....	698	667.....	613
467.....	529	534.....	778	601.....	699	668.....	706
468.....	530	535.....	785	602.....	700	669.....	707
469.....	532	536.....	784	603.....	671	670.....	717
470.....	548	537.....	783	604.....	672	671.....	718
471.....	534	538.....	782	605.....	673	672.....	732
472.....	561	539.....	787	606.....	674	673.....	738
473.....	547	540.....	788	607.....	675	674.....	721
474.....	533	541.....	799	608.....	676	675.....	715
475.....	531	542.....	789	609.....	—	676.....	737
476.....	535	543.....	—	610.....	—	677.....	709
477.....	536	544.....	—	611.....	677	678.....	724
478.....	537	545.....	779	612.....	—	679.....	719
479.....	538	546.....	780	613.....	695	680.....	722
480.....	539	547.....	—	614.....	694	681.....	744
481.....	—	548.....	786	615.....	693	682.....	728
482.....	—	549.....	797	616.....	668	683.....	740
483.....	555	550.....	798	617.....	620	684.....	741
484.....	556	551.....	—	618.....	621	685.....	743
485.....	—	552.....	865	619.....	622	686.....	742
486.....	557	553.....	858	620.....	626	687.....	776
487.....	558	554.....	—	621.....	631	688.....	749
488.....	559	555.....	—	622.....	633	689.....	874
489.....	560	556.....	790	623.....	634	690.....	875
490.....	522	557.....	—	624.....	628	691.....	876
491.....	566	558.....	800	625.....	635	692.....	877
492.....	567	559.....	802	626.....	636	693.....	878
493.....	568	560.....	801	627.....	637	694.....	888
494.....	—	561.....	805	628.....	641	695.....	—
495.....	569	562.....	803	629.....	642	696.....	930
496.....	570	563.....	804	630.....	643	697.....	924
497.....	571	564.....	806	631.....	642	698.....	925
498.....	575	565.....	807	632.....	645	699.....	929
499.....	576	566.....	808	633.....	639	700.....	926
500.....	—	567.....	809	634.....	—	701.....	935
501.....	577	568.....	—	635.....	—	702.....	938
502.....	572	569.....	837	636.....	646	703.....	939
503.....	578	570.....	849	637.....	647	704.....	028
504.....	573	571.....	619	638.....	648	705.....	937
505.....	574	572.....	—	639.....	649	706.....	932
506.....	580	573.....	666	640.....	650	707.....	927
507.....	582	574.....	923	641.....	651	707.....	936
508.....	583	575.....	—	642.....	653	709.....	933
509.....	584	576.....	681	643.....	654	710.....	934
510.....	585	577.....	922	644.....	655	711.....	—



## SCHULTZ-GREEN NUMBERS

Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.
1.....	394	66.....	—	131.....	—	196.....	—
2.....	396	67.....	38	132.....	—	197.....	—
3.....	397	68.....	—	133.....	—	198.....	660
4.....	398	69.....	41	134.....	95	199.....	125
5.....	1	70.....	43	135.....	—	200.....	—
6.....	3	71.....	45	136.....	95	201.....	—
7.....	4	72.....	—	137.....	8	202.....	—
8.....	—	73.....	—	138.....	87	203.....	120
9.....	399, 400	74.....	47	139.....	88	204.....	121
10.....	401, 402	75.....	48	140.....	91	205.....	412
11.....	405, 406	76.....	49	141.....	92	206.....	414
12.....	403	77.....	50	142.....	89	207.....	413
13.....	407, 408	78.....	51	143.....	84	208.....	134
14.....	411	79.....	54	144.....	85	209.....	135
15.....	409	80.....	52	145.....	86	210.....	136
16.....	415	81.....	53	146.....	93	211.....	137
17.....	416	82.....	55	147.....	—	212.....	138
18.....	404	83.....	56, 57	148.....	—	213.....	139
19.....	—	84.....	69	149.....	—	214.....	140
20.....	—	85.....	—	150.....	98	215.....	—
21.....	—	86.....	70	151.....	97	216.....	—
22.....	—	87.....	—	152.....	—	217.....	142
23.....	94	88.....	—	153.....	—	218.....	—
24.....	—	89.....	—	154.....	—	219.....	—
25.....	124	90.....	—	155.....	—	220.....	141
26.....	—	91.....	—	156.....	—	221.....	—
27.....	—	92.....	—	157.....	—	222.....	—
28.....	—	93.....	—	158.....	123	223.....	143
29.....	—	94.....	71	159.....	—	224.....	144
30.....	—	95.....	72	160.....	101	225.....	—
31.....	7	96.....	—	161.....	102	226.....	145
32.....	16	97.....	—	162.....	—	227.....	146
33.....	17	98.....	—	163.....	103	228.....	148
34.....	18	99.....	—	164.....	—	229.....	—
35.....	10	100.....	74	165.....	—	230.....	155
36.....	11	101.....	73	166.....	105	231.....	156
37.....	13	102.....	75	167.....	104	232.....	150
38.....	14	103.....	76	168.....	107	233.....	152
39.....	15	104.....	58	169.....	106	234.....	153
40.....	20	105.....	59	170.....	108	235.....	151
41.....	21	106.....	60	171.....	110	236.....	154
42.....	—	107.....	66	172.....	111	237.....	157
43.....	22	108.....	—	173.....	—	238.....	158
44.....	—	109.....	62	174.....	112	239.....	—
45.....	—	110.....	61	175.....	114	240.....	149
46.....	—	111.....	63	176.....	113	241.....	—
47.....	23	112.....	65	177.....	116	242.....	—
48.....	24	113.....	64	178.....	117	243.....	173
49.....	25	114.....	67	179.....	—	244.....	174
50.....	—	115.....	—	180.....	—	245.....	172
51.....	661	116.....	68	181.....	—	246.....	161
52.....	28	117.....	—	182.....	132	247.....	163
53.....	29	118.....	—	183.....	—	248.....	159
54.....	30	119.....	77	184.....	—	249.....	160
55.....	33	120.....	79	185.....	—	250.....	162
56.....	31	121.....	78	186.....	118	251.....	164
57.....	32	122.....	—	187.....	119	252.....	167
58.....	26	123.....	80	188.....	—	253.....	168
59.....	34	124.....	81	189.....	—	254.....	170
60.....	39	125.....	82	190.....	126	255.....	169
61.....	36	126.....	83	191.....	—	256.....	—
62.....	40	127.....	—	192.....	128	257.....	—
63.....	—	128.....	—	193.....	129	258.....	—
64.....	—	129.....	—	194.....	130		
65.....	37	130.....	—	195.....	—		

Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.
259.....	—	326.....	252	393.....	276	461.....	368
260.....	—	327.....	248	394.....	269	462.....	—
261.....	—	328.....	249	395.....	271	463.....	—
262.....	177	329.....	250	396.....	296	464.....	—
263.....	178	330.....	—	397.....	295	465.....	—
264.....	—	331.....	258	398.....	298	466.....	—
265.....	—	332.....	—	399.....	297	467.....	374
266.....	183	333.....	251	400.....	—	468.....	375
267.....	185	334.....	253	401.....	301	469.....	—
268.....	—	335.....	—	402.....	303	470.....	376
269.....	184	336.....	—	403.....	304	471.....	—
270.....	187	337.....	254	404.....	299	472.....	—
271.....	189	338.....	—	405.....	307	473.....	377
272.....	188	339.....	—	406.....	306	474.....	372
273.....	—	340.....	225	407.....	309	475.....	373
274.....	175	341.....	—	408.....	310	476.....	—
275.....	180	342.....	220	409.....	246	477.....	379
276.....	182	343.....	226	410.....	311	478.....	371
277.....	—	344.....	227	411.....	312	479.....	378
278.....	—	345.....	231	412.....	314	480.....	380
279.....	196	346.....	232	413.....	320	481.....	381
280.....	—	347.....	228	414.....	321	482.....	382
281.....	—	348.....	229	415.....	—	483.....	213
282.....	—	349.....	230	416.....	322	484.....	214
283.....	197	350.....	216	417.....	313	485.....	384
284.....	201	351.....	221	418.....	315	486.....	383
285.....	202	352.....	256	419.....	318	487.....	385
286.....	203	353.....	257	420.....	—	488.....	386
287.....	204	354.....	255	421.....	316	489.....	387
288.....	—	355.....	262	422.....	318	490.....	—
289.....	—	356.....	259	423.....	317	491.....	393
290.....	200	357.....	260	424.....	318	492.....	—
291.....	198	358.....	261	425.....	—	493.....	425
292.....	199	359.....	—	426.....	319	494.....	426
293.....	—	360.....	265	427.....	324	495.....	427
294.....	190	361.....	—	428.....	323	496.....	429
295.....	210	362.....	272	429.....	325	497.....	431
296.....	191	363.....	277	430.....	326	498.....	444
297.....	195	364.....	278	431.....	206	499.....	428
298.....	—	365.....	279	432.....	207	500.....	430
299.....	—	366.....	280	433.....	208	501.....	432
300.....	211	367.....	282	434.....	209	502.....	433
301.....	332	368.....	—	435.....	—	503.....	—
302.....	333	369.....	283	436.....	360	504.....	434
303.....	328	370.....	281	437.....	361	505.....	435
304.....	329	371.....	284	438.....	353	506.....	436
305.....	330	372.....	285	439.....	352	507.....	—
306.....	236	373.....	275	440.....	351	508.....	—
307.....	240	374.....	274	441.....	—	509.....	443
308.....	—	375.....	286	442.....	362	510.....	445
309.....	239	376.....	268	443.....	364	511.....	447
310.....	238	377.....	287	444.....	349	512.....	448
311.....	—	378.....	246	445.....	350	513.....	449
312.....	242	379.....	—	446.....	355	514.....	450
313.....	243	380.....	327	447.....	354	515.....	451
314.....	235	381.....	288	448.....	363	516.....	452
315.....	217	382.....	289	449.....	365	517.....	454
316.....	241	383.....	—	450.....	357	518.....	453
317.....	219	384.....	—	451.....	356	519.....	460
318.....	—	385.....	—	452.....	358	520.....	456
319.....	234	386.....	294	453.....	366	521.....	457
320.....	244	387.....	291	454.....	365	522.....	490
321.....	245	388.....	292	455.....	367	523.....	446
322.....	246	389.....	—	456.....	359	524.....	462
323.....	—	390.....	—	457.....	365	525.....	463
324.....	247	391.....	293	458.....	—	526.....	465
325.....	—	392.....	270	459.....	369	527.....	464
				460.....	370	528.....	466



Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.
529	467	597	523	665	657	733	—
530	468	598	522	666	573	734	—
531	475	599	525	667	656	735	—
532	469	600	—	668	616	736	—
533	474	601	526, 527	669	579	737	676
534	471	602	528	670	580	738	673
535	476	603	529	671	603	739	—
536	477	604	531	672	604	740	683
537	478	605	530	673	605	741	684
538	479	606	532	674	606	742	686
539	480	607	533	675	607	743	685
540	458	608	—	676	608	744	681
541	—	609	—	677	611	745	—
542	—	610	665	678	581	746	—
543	440	611	664	679	584	747	—
544	441	612	666	680	585	748	—
545	442	613	667	681	576	749	688
546	439	614	662	682	586	750	—
547	473	615	662	683	585	751	—
548	470	616	659	684	589	752	—
549	444	617	663	685	590	753	—
550	—	618	658	686	592	754	—
551	—	619	521	687	591	755	—
552	—	620	617	688	593	756	—
553	—	621	618	689	594	757	—
554	—	622	619	690	—	758	—
555	483	623	—	691	595	759	—
556	484	624	—	692	596	760	—
557	486	625	—	693	615	761	—
558	487	626	620	694	614	762	—
559	488	627	—	695	613	763	—
560	489	628	624	696	597	764	—
561	472	629	—	697	599	765	—
562	—	630	—	698	600	766	—
563	—	631	621	699	601	767	—
564	—	632	—	700	602	768	—
565	—	633	622	701	598	769	418
566	491	634	623	702	—	770	417
567	492	635	625	703	588	771	421
568	493	636	626	704	588	772	419
569	495	637	627	705	588	773	422
570	496	638	—	706	668	774	423
571	497	639	633	707	669	775	424
572	502	640	—	708	—	776	687
573	504	641	628	709	677	777	—
574	505	642	629, 631	710	—	778	534
575	498	643	630	711	—	779	545
576	499	644	—	712	—	780	546
577	501	645	632	713	—	781	—
578	503	646	636	714	—	782	538
579	—	647	637	715	675	783	537
580	506	648	638	716	—	784	536
581	—	649	639	717	670	785	535
582	507	650	640	718	671	786	548
583	508	651	641	719	679	787	539
584	509	652	—	720	—	788	530
585	510	653	642	721	674	789	542
586	511	654	643	722	680	790	556
587	512	655	644	723	—	791	—
588	513	656	646	724	678	792	—
589	514	657	647	725	—	793	—
590	515	658	648	726	—	794	—
591	516	659	650	727	—	795	—
592	517	660	651	728	682	796	—
593	518	661	652	729	—	797	549
594	519	662	653	730	—	798	550
595	520	663	655	731	—	799	541
596	521	664	—	732	672	800	558

Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.
801.....	560	867.....	—
802.....	559	868.....	—
803.....	562	869.....	—
804.....	563	870.....	—
805.....	561	871.....	—
806.....	564	872.....	—
807.....	565	873.....	—
808.....	566	874.....	689
809.....	567	875.....	690
810.....	—	876.....	691
811.....	—	877.....	692
812.....	—	878.....	693
813.....	—	879.....	—
814.....	—	880.....	—
815.....	—	881.....	—
816.....	—	882.....	—
817.....	—	883.....	—
818.....	—	884.....	—
819.....	—	885.....	—
820.....	—	886.....	—
821.....	—	887.....	—
822.....	—	888.....	694
823.....	—	889.....	—
824.....	—	890.....	—
825.....	—	891.....	—
826.....	—	892.....	—
827.....	—	893.....	—
828.....	—	894.....	—
829.....	—	895.....	—
830.....	—	896.....	—
831.....	—	897.....	—
832.....	—	898.....	—
833.....	—	899.....	—
834.....	—	900.....	—
835.....	—	901.....	—
836.....	—	902.....	—
837.....	569	903.....	—
838.....	—	904.....	—
839.....	—	905.....	—
840.....	—	906.....	—
841.....	—	907.....	—
842.....	—	908.....	—
843.....	—	909.....	—
844.....	—	910.....	—
845.....	—	911.....	—
846.....	—	912.....	—
847.....	—	913.....	—
848.....	—	914.....	—
849.....	570	915.....	—
850.....	—	916.....	—
851.....	—	917.....	—
852.....	—	918.....	—
853.....	—	919.....	—
854.....	—	920.....	—
855.....	—	921.....	—
856.....	—	922.....	577
857.....	—	923.....	574
858.....	553	924.....	697
859.....	—	925.....	698
860.....	—	926.....	700
861.....	—	927.....	700
862.....	—	928.....	704
863.....	—	929.....	699
864.....	—	930.....	696
865.....	552	931.....	420
866.....	—		

Schultz Nos.	Green Nos.	Schultz Nos.	Green Nos.
932.....	706	936.....	708
933.....	709	937.....	705
934.....	710	938.....	702
935.....	701	939.....	703

## CHEMICAL FIRE HAZARDS

(Continued from page 440.)

*Grinding or Milling* is a frequent cause of trouble, due to friction, spontaneous heating or presence of combustible dust, especially in high-speed attrition devices. Undoubtedly the safest types of grinding apparatus are some of its many excellent forms of ball mills, which may now be procured in all sizes and kinds from those of only a few grams' capacity, for laboratory use, to the largest size.

*Evaporation* or crystallization is usually devoid of any hazard except the indirect one of largely increased corrosion of electrical fittings and sprinkler equipment (where there is any), where acetates, or the like, are prepared, due to vapors of an acid nature in presence of steam or water vapor acting on brass, copper or iron.

*Crystallization* from solution in inflammable organic solvents is hazardous, especially when the solvent is recovered and special precautions are required.

*Filtration* is not usually hazardous except where the press cake remaining from its operation consists of such material as fuller's earth, bone black, or the like impregnated with readily oxidizable substances, in which case it may be a severe hazard if this is not immediately removed to a safe place and the filter cloths washed and dried.

*Distillation* of inflammable organic liquids is always attended by more or less hazard and this is usually so obvious that almost everyone recognizes it and takes special precaution as to electric lights, switches, fuses or similar devices. The principal cause of trouble in distillation is from the breaking of glass sight boxes or gauge glasses, blowing out of pressure gauge fittings and carelessness around tail pipes or discharges from condensers.

*Autoclaving*, sulphonating, caustic melting, and similar operations conducted at high temperatures and pressures are a frequent cause of explosion followed by fire and these should be carried on in rooms or buildings of non-combustible construction with light roofs. When the nature of the case permits relief or vent pipes to open air should be provided and if necessary safety discs or plugs may be devised that will rupture in case of overpressure.

*Reduction* is frequently a source of danger, especially when such highly reactive materials as zinc dust are used. The reducing material should be fed in in small quantities at regular intervals and the reaction carefully watched by experienced employees who have sufficient sense to call the supervising chemist or other skilled person if the reaction appears to be getting beyond control or any un-



usual phenomena are noticed. Operations of this nature, when hydrogen is evolved, are especially risky.

*Nitration* is always hazardous, even when no more than the first stage or mononitration is carried on. I believe that there have been more accidents or fires caused by this process than almost any other one thing. The substances nitrated are nearly always of a highly combustible nature and there have been a number of accidents due to nitration of benzene or toluene that seems to be utterly unexplainable except on the general proposition that nearly all nitro-compounds are comparatively of an unstable nature and are prone to eccentricities.

*Chlorination* is not usually hazardous if proper precautions are taken in handling the storage of benzene, toluene or other inflammable liquids except that chlorination of toluene or similar compounds in glass flasks frequently in close proximity to a powerful electric radiant, is very hazardous and should be carried on in some place where the fire resulting from a ruptured flask would cause little damage.

*Sublimation* is usually a hazardous operation, especially in case of camphor, naphthalene, beta-naphthol, salicylic acid and similar substances which are highly combustible, especially in a fine state of subdivision. There have been a number of serious fires and accidents directly due to improperly constructed or carelessly operated sublimers.

The general subject of heating is of prime importance. Steam heat is unquestionably the safest and probably a properly arranged and safeguarded oil circulation is the next best where high temperatures are required. Open gas flames and direct coal or coke fires are highly dangerous and should be avoided. Where a coal or coke fire is an absolute necessity great care should be taken in arrangement of fire pit and when the substance heated is of a combustible nature the firing should be from outside the building and care should be observed so that by no possibility could inflammable substances boil over or froth over onto a hot flue, and in all cases heated kettles should be vented to open air by pipe of ample size or if open fans are used they should be under a hood of ample size.

#### HAZARDOUS CHEMICALS

First, the strong acids, sulphuric, nitric and hydrochloric; these, while not hazardous in themselves, are likely to make trouble if they are brought in contact with other compounds but, as usually handled and stored, do not constitute a serious hazard, their properties being so well known they are in the very nature of things usually kept in a safe manner. Possibly nitric acid is more hazardous than the others, as there are cases known of serious fires caused by its leaking onto organic matter, such as hay, straw, dust, and so on.

Probably the most seriously hazardous chemicals, outside of those known to be of a positively explosive nature, are those containing a large percentage of oxygen, namely, the nitrates, chlorates, peroxides of the alkali metals, picrates, permanganates, and so on. These, while not in-

flammable in the ordinary sense of the term, give up their oxygen content so readily, especially in the presence of readily oxydizable material, that their presence in a fire possibly originating from some other cause is nearly always productive of disastrous results. There are a few compounds met with that are apt to be hazardous in presence of moisture, as sodium peroxide, calcium carbide, zinc dust and other finely divided metals, lime, and possibly caustic soda under certain conditions.

Certain coal-tar colors and intermediates are thought to be hazardous to some extent, for instance, certain sulphur dyes, and nitrosophenol. The hazards of such articles as phosphorus, metallic sodium and potassium are well recognized and there are comparatively few places where they will be met with outside of a laboratory. Inflammable gases are rarely met with, the commonest being hydrogen which is generated during the course of a good many reactions, especially those of an electrolytic nature. I am inclined to think that hydrogen has been to blame in a number of fires of an obscure or unexplainable nature. Acetylene is dangerous but there are not many manufacturing processes where it is likely to be generated.

Probably the preponderating hazard in chemical plants generally, and that responsible for a great many fires, is the use of the organic solvents. These are all more or less volatile at ordinary temperatures, and they are all readily inflammable in the liquid as well as the gaseous phase. They form in the gaseous condition easily inflammable and more or less explosive mixtures with air. These are principally the various alcohols, ethers, ketones, benzene, toluene, xylene, etc. Probably the most hazardous solvent ordinarily used is carbon disulphide. More than ordinary precautions should be taken in its storage and use, and any processes wherein it is used; for example, as a solvent in the making of rubber cement or as a raw material in the manufacture of thiocarbanilid, should be confined to small and well detached buildings of small value.

The solvents derived from petroleum are rarely met with in chemical practice except occasionally as a means of extracting alkaloids, and perhaps for washing certain precipitates or residues. As a matter of fact most fires of any note in chemical plants falling under the writer's observation, have been caused by downright and reprehensible carelessness, and could have been avoided. — "Drug & Chemical Markets."

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